McGraw-Hill
Publishing Company, Inc.
James H. McGraw, *President*
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American Machinist

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Volume 67 New York, July 28, 1927 Number 4

Buying Machinery Is a Tough Job

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WE WANT to buy more efficient machinery and many people want to sell it to us, yet we have much difficulty in getting together. One would expect few hitches in such a program but there are many. In the belief that the point of view of the medium-sized manufacturing plant may be helpful, we are taking this opportunity to explain why buying machinery is a tough job. If we had accurate information on the new machines as they come out that was directly applicable to our problems, the job of buying machinery would be greatly simplified. We get valuable information from the trade papers. Ten of our shop foremen are required to read the trade papers which deal with shop operation. Each man, as he reads the publications, marks subjects for the attention of other foremen who may be directly interested. In our shop meetings these matters are brought up to decide whether manufacturers representatives shall be invited to come in and give us more details.

We look to the trade papers for information that new and better machinery is available. We look to the machinery salesman to tell us definitely what we may expect. If he knows his business we get the answer as soon as he understands the problem that is facing us

Here is the first point at which loss of time occurs. We do not expect machinery builders to be able to tell us exactly what we want to know in their advertising. Most machines are applicable to many lines of manufacture, each of which varies a good deal from every other. We do get a great deal of information, however, from the editorial matter of the trade papers which describes what some plant is actually doing with the equipment.

We look to the trade papers for information that new and better machinery is available. From that point on, we have to find out for ourselves whether the new machines will do our jobs more efficiently. If a machinery development is important enough to reach the trade papers, we find out about it. If the new machine is so new that the trade papers have not mentioned it, we look on the machine as still in the experimental stage.

What will a given machine do for us?

We look to the machinery salesman to tell us definitely what we may expect. In many cases it means that someone has to go out into the plant and explain to the salesman the details of the job we have, together with the speed and cost records which have to be beaten to justify the purchase of new equipment.

Here is another point at which we frequently lose a great deal of time. If the machinery salesman knows his business we get the answer as soon as he understands the problem. But not all salesmen have the shop point of view. It is surprising that many salesmen fail to appreciate the fact that we know that their principal interest is in making a sale. We know that, and the best way for them to help the cause along is to show us that we will suffer high costs if we do not buy. Just telling us we are dumb if we do not buy usually accomplishes little more than to make us antagonistic.

When a machinery man comes into our plant and talks our language and gives us real information, we will stand a lot of rough language and like it. We like machinery experts. We have had them walk out into the plant and show us how to make a killing in a manufacturing sense.

If other people use the machinery under consideration, we like to interview the shop forces and check up the ability of the machine to stand up under piece-work schedules. Written testimonials are not very impressive. We like to talk to the man who actually supervises the operation of the machine.

If a machine will pay for itself in two years, we will buy, but we want to know that the machine will hang together for two years if we are buying on that estimate. If the equipment is poorly designed and will not stand

our high-speed schedules, we may lose all that we expected to save and more.

Our friends in the manufacturing business in this district give us valuable testimony.

Now we are ready to buy but the salesmen involved do not know it. Our purchasing department spends enough time on the job to find out what the price of a machine really is. That is the purchasing department's job. We try to spend our money for new machinery to the best advantage. This is not a philanthropic institution.

We have had too many experiences in which the salesman quoted the superintendent a certain price and then cut it by twenty per cent when the purchasing agent put him on the grill. That is bad business. Now, the purchasing department finds out by methods all its own what the price is before we decide which machine to buy.

The Man Who Knows Wins

There is no use denying that from the shop point of view as distinguished from the management point of view we like to favor the salesman who knows the most about our job and the most about his machine. The man who knows is the man who can help us if we run into conditions which were not foreseen in our original estimate. We do not want cheap machinery. We are held by the management for manufacturing results and intelligent advice on the part of the machinery builder's representative is an important consideration in the purchase of new machines.

We get manufacturing results by the application of brains and intelligence. We know and appreciate the outstanding ability of some of the machinery builders' representatives and we consider such ability a legitimate element of value in connection with the product for which we are justified in paying liberally.

The machinery building industry is blessed or cursed, according to one's point of view, with very real competition. After we have made our choice, some one usually has to lose an order. The loser frequently expects us to tell him why he lost the order. It is fair and reasonable that he should want to know. If he could be content with the information, we would take the trouble to tell him, but unfortunately an attempt to tell him why he lost usually starts an argument and brings down a great deal of vituperation on the heads of some of our people.

After we have analyzed a group of machines to the best of our ability, there still enter into the final judg ment a great many intangible elements which affect the decision on which to buy. These intangible elements are difficult to explain to the salesman who lost. For instance, we bought a machine which promised to pay for itself in six months. Then we made a change in the product which threatened to make that new machine a piece of scrap equipment. The representative of the builder of that machine, at his own expense and through intensive study of the problem, adapted the machine and the new product to each other so that the original estimate of saving was actually bettered. He sold us the next machine we bought in his line in the face of devastating competition. Purely aside from the fact that we like to believe that we have decent standards of fair play, we canot afford to let ability of that kind get away from us.

Half the salesmen who try to sell us equipment rave about their service. It leaves us cold. We can handle the equipment in our plant. If it is the kind of equipment which needs daily service, we have no use for it. Service is a term which is badly overworked. It does not mean the thing we want in connection with the machine we buy. We cannot apply the term "Service" to the valuable advice offered by some of the machinery builders' representatives. "Service" means to us simply prompt and courteous treatment of a cash customer. We get it as a matter of course.

Most of the machines we buy could be built for half the labor and material that was actually expended in their manufacture. Machine tools available on the market today are nothing short of marvelous in performance. Yet many machinery builders are making very small profit, if any. Machine tool builders have concentrated on the utility of the machine—their best engineers are out in the field applying the machines to industry. The day is rapidly approaching when some of this ability will be used to make some money for the machinery builder.

Most of the machine tools being built today with heavy gray-iron castings can be built in welded steel construction at less than half the total labor and material cost. Not only can the cost be strikingly reduced but the welded steel construction will produce a better machine. Steel is stronger and more rigid than cast iron and wearing surfaces may be hardened to give the machine longer life.

Some machinery builders have started on programs of replacing castings with welded steel construction. Machinery building institutions that cannot meet the new problems of manufacturing will face extinction, which is now just around the corner for many of them.

An Old Bit-Brace—Discussion

By Ernest W. Fraser
Bedforshire, England

I WAS very much interested in the article by George Wilson, under the title given above, and published on page 568, Vol. 66, of the *American Machinist*.

Some years ago I saw numbers of these old wooden braces, owned mostly by elderly cabinet makers, and I well remember an old friend of mine showing me one which he said he had bought when he was an apprentice. This brace would be nearly one hundred years old by now. Since he has often told me he always bought his tools from a toolmaker named Buck of Holborn, I conclude the brace came from there. I have also a faint recollection of seeing the name stamped on the brasswork. The bit snap certainly goes back to at least 1816, and is illustrated on a wood brace in Bergeron's well-known book on turning (second edition, Paris, 1816). Other forms of square-shank bits having means to prevent their falling out of this type of brace are shown in Hulot's "L'Art du Tourneur Mecanicien" (1775), but not the type illustrated by Bergeron. Hulot also gives working drawings of a wooden brace of early pattern, minus the brass strengthening plates.

A plant manufacturing portable typewriters has them scattered all through the shop for the foremen and clerks to use. Wonder if that isn't an idea that could be adopted profitably in plants making other things?

Automotive Production

Assembly of the Marmon "8"

By Fred H. Colvin
Editor, American Machinist

Assembling various units, including engine and its test stand on cross-assembly lines that feed the chassis assembly at the proper point

ECONOMICAL assembly depends, among other things, on having a plant so arranged that the various units feed into the assembly line at the proper point, and as they are needed. The layout of plant 3 of the Marmon Motor Car Co., where the new 8-cylinder car is being produced, contains several unusual features, some of which are illustrated and described in this article.

The frame stampings are received in the rough, as can be seen from the side frames standing on end at the right in Fig. 1. They are assembled as shown in the foreground, on the rails that support them, and as they are completed they are moved along on these rails toward the washing tank at *A*. Beyond this tank the frames are placed on the conveyor shown in Fig. 2, and here some of the accessories, such as spare-tire brackets, fuel-tanks and mufflers, are put in place. Air-driven nut tighteners assist in securing rapid assembly. A little farther down the line is the device for hoisting the rear-axle assembly and placing it in position in the frame, as in Fig. 3. This device can also be seen in the distance in Fig. 1. The hoisting device is also used to compress the springs by means of the two air cylinders shown, so as to assist in placing the rubber absorption pads on the ends of the springs in their proper pockets, as at *A* and *B*. Two of the rubber pads are shown at *C* and *D*. The spring is held in position in the A-frame by means of pins, at *E* and *H*. The whole device is handled by an overhead crane with the floor controls shown, so that the assemblers can easily pick up the complete rear axle from the floor and, after the springs have been flexed enough to permit the insertion of the absorption pads, the whole unit can be lowered into place in the frame. The device is positive in its action, and its use saves all lifting on the part of the assemblers.

Fig. 1—Frames after assembly

The front wheels are placed in position in a similar manner, and when the frame reaches the hooded portion of the assembly line, shown in Fig. 4, the under part is sprayed with Duco without gumming up the entire assembly line, as might easily have happened in the old days. A powerful exhaust system at the top of this hooded canopy over the spraying point removes practically all of the fumes and odors due to the spraying process, and yet leaves the frame free to travel toward its completion. Just beyond the spraying booth, which is almost at the end of the frame line, and at right angles to the main assembly line, is a very ingenious roll-over device that can be seen in Fig. 5. When the frame reaches the proper point, four hooks, *A*, *B*, *C* and *D*, are brought up beside the side frames, hooked over them and are clamped down by a cam. Then the arms *E* and *H* are rotated lifting the chassis and depositing it right-side-up so

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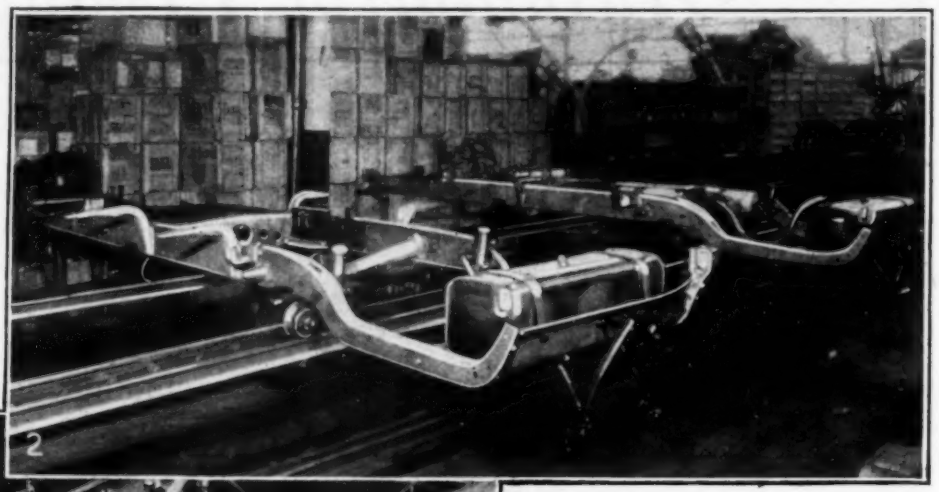

Fig. 2 — Attaching accessories to the frame. In attaching such accessories as spare-tire brackets, fuel tanks and mufflers, the time is shortened by the use of air-driven nut tighteners

Fig. 3—Placing the rear-axle assembly. The hoisting device is used to compress the springs by means of pistons in the two air cylinders, so as to assist in placing the rubber absorption-pads in their pockets. The whole device is handled by an overhead crane controlled from the floor, so that the assemblers can easily pick up the axle from the floor and, after flexing the springs the proper amount, lower the whole unit into the frame

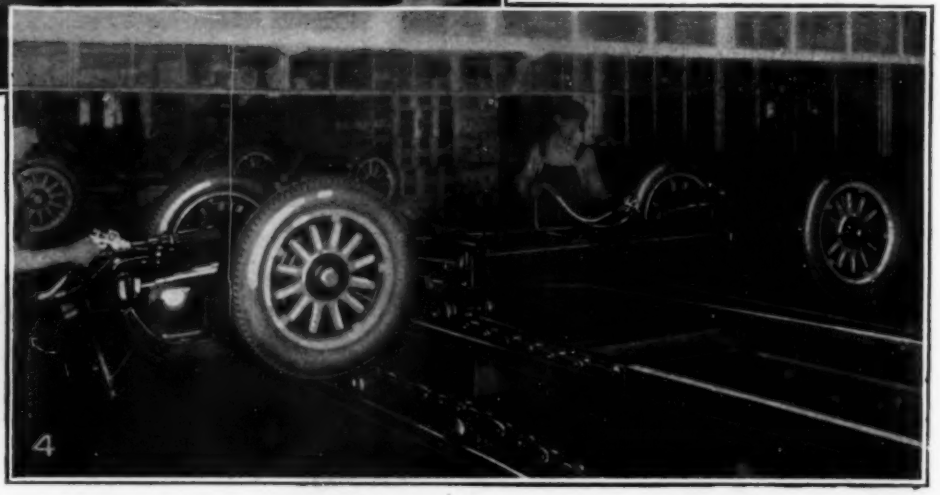

Fig. 4—After all the wheels have been put in place, and when the frame reaches the hooded portion of the assembly line, the under part is sprayed with Duco

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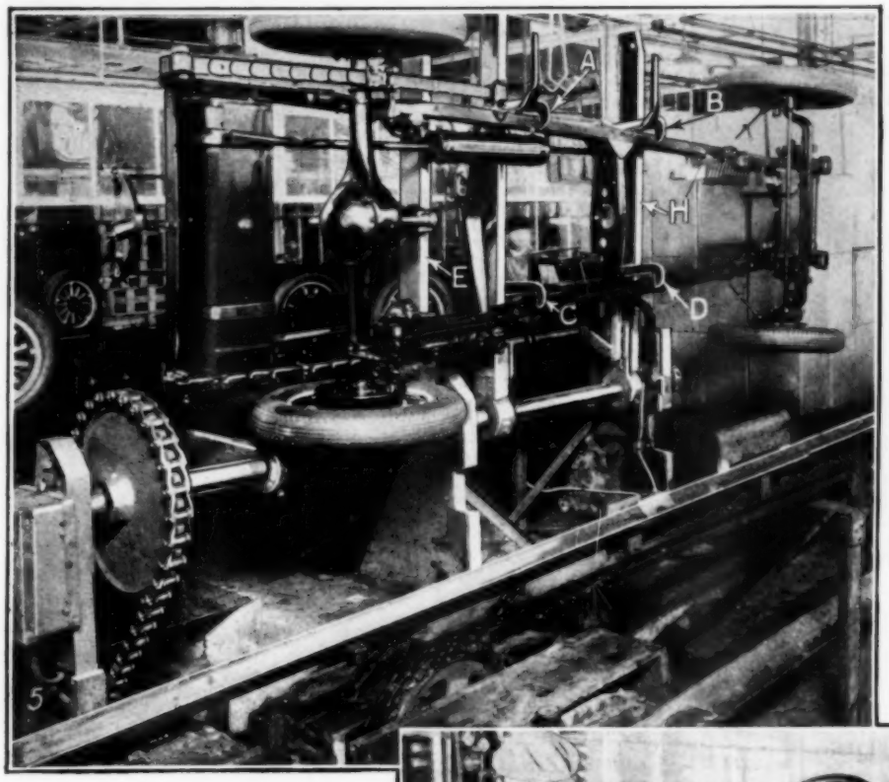

Fig. 5 — Automatic "roll-over" in the assembly line. Just beyond the spraying booth and at a right angle to the main-assembly line, the frame is rolled over to bring it right-side-up. When the frame has reached the proper point, four hooks are brought up beside the side members. Then arms to which the hooks are attached, are rotated, lifting the frame and depositing it right-side-up, so that the wheels rest in V-shaped tracks. From here it is moved down the line by a chain conveyor

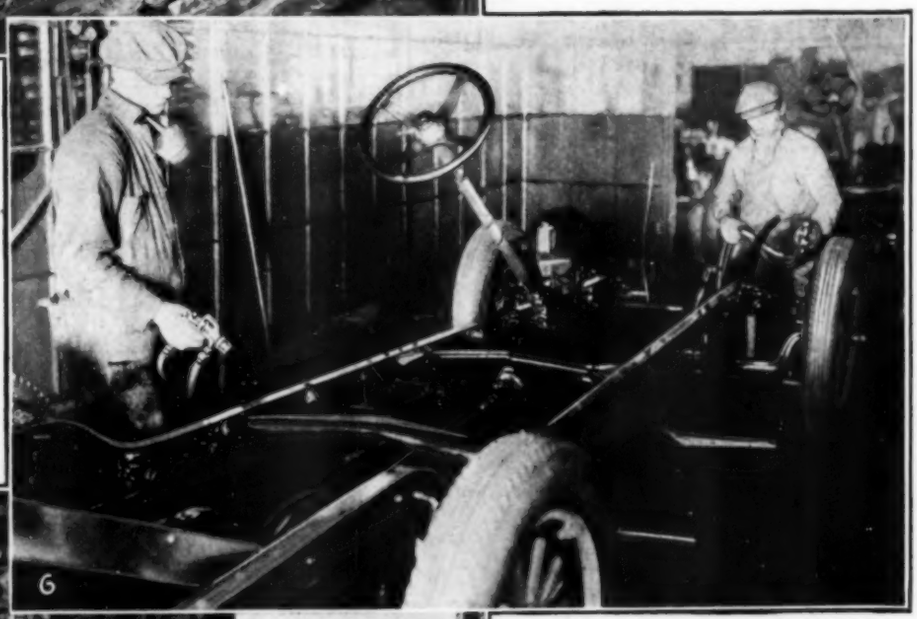

Fig. 6 — The second spraying room. After the steering gear has been attached the upper part of the chassis is sprayed with Duco in the glass-enclosed room

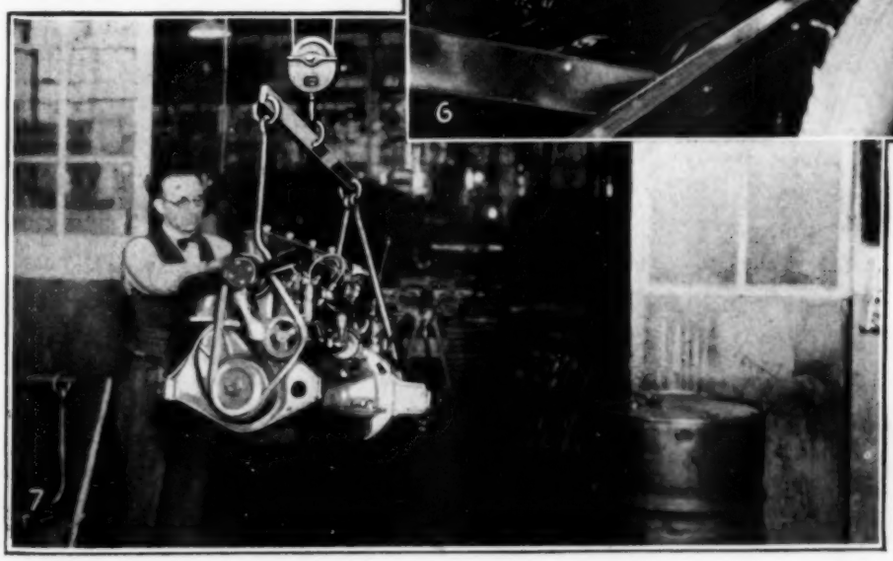

Fig. 7 —Delivering the engine. After the upper part of the chassis has received its coat of Duco, it goes down the line to have the engine put in place

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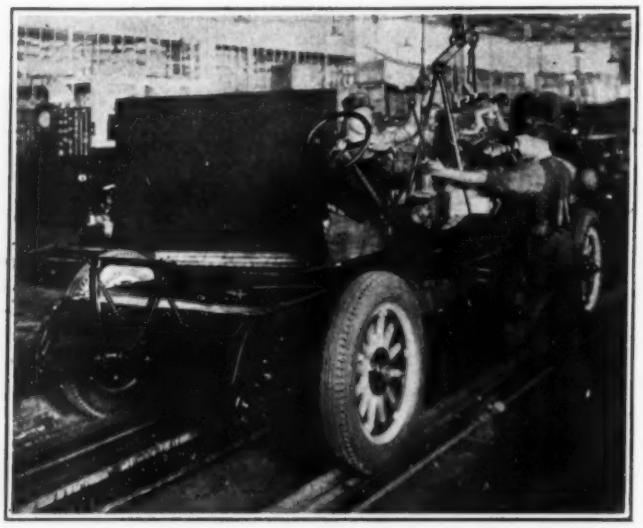


Fig. 8—Lowering the engine into the chassis

that the tired wheels rest in the V-shaped tracks shown. Here the continuously-moving conveyor chain takes hold of the chassis and moves it down the line to receive the engine, steering gear, body and other parts.

After the steering gear has been attached, the chassis passes through another spraying room, Fig. 6, and the upper side receives its coat of Duco, and it passes out of the glass enclosure. By this time the engine assembly line has been reached and a complete engine is brought out of the engine-testing department as in Fig. 7, and is swung into place as in Fig. 8. A little further down the line the chassis reaches the body-delivery point where the body-handling and hoisting device, shown in Fig. 9, picks up the body, carries it over the assembly line and lowers it into position as shown. The hooks reach into the wheel housings at the rear of the body

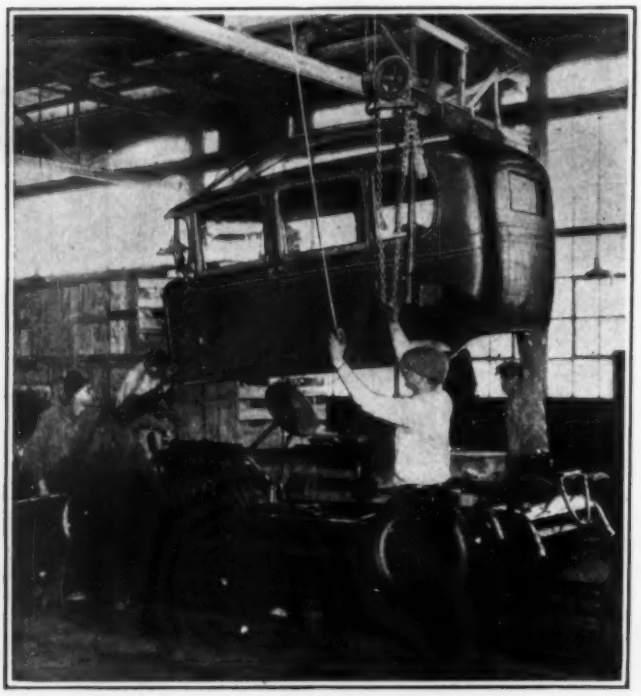


Fig. 9—Device for handling closed bodies

and over the top and down the front, so as to grip underneath the cowl. This method of suspension balances the body well and enables it to be handled very readily. The trolley on the cross-rail overhead is provided with electric control, while the body hoist is manipulated by the chain shown.

Large vs. Limited Production

EVERY industry has its own problems. But it seems next to impossible for those in one industry to understand the problems of those in other industries. Manufacturers of automobiles, or other products for which there is a wide market, cannot at all appreciate the problems that confront the makers of machine tools or other products that have a limited market.

The market for the automobile depends to a great extent upon the price for which it can be sold. But the market for such special machines as crankshaft lathes, or similar machines, depends much more on the number of automobiles sold than on the price asked for the lathe. The automobile maker will, perhaps, say that a lower-priced lathe would enable him to sell his cars for less money and so widen the market. But the difference due to the lower price of the lathe, could be discovered only by a certified public accountant. If, on the other hand, the price of the lathe were doubled, it would probably make little difference in the total demand for it.

The modern automobile is, perhaps, the greatest manufacturing achievement of all ages. In spite of increased cost of both labor and materials, the quality is constantly being improved and the price trend is still downward. Large output and machine tools of unheard-of productive capacity have made these conditions possible.

The demand for machine tools, however, has not increased—rather the opposite is true in many cases. The increased productiveness of machines has made it possible to secure a larger output with fewer machines. But though the machines have been greatly improved, there is still a great tendency to consider a lathe as only a lathe, and to judge it by pre-war standards when it comes to price.

In reality, however, lathes are no longer merely lathes in the old sense. They are now turning machines having heat-treated steel gears, ball and roller bearings and better oiling arrangements than ever before, and are altogether different machines as to looks, weight, and amount of work in their construction. If the new lathes could be sold in the same quantities as automobiles, the prices would doubtless follow the automobile trend. But because of their increased productiveness their field is not large, and though the prices may seem high to the makers of products in very large quantities—they are in reality too low to afford security as to continued improvements and developments.

The sooner the large manufacturer understands the problems of the maker whose output is necessarily small, the better it will be for all concerned.

Airplanes are now being built that will land at lower speeds than formerly. A small two-passenger ship with two engines now lands at 25 miles per hour.

National Screw Thread Standards Compared

By John Gaillard
American Engineering Standards Committee

Summary of present standard practice in the United States, Austria, Belgium, Czechoslovakia, Finland, France, Germany, Great Britain, Holland, Italy, Japan, Sweden and Switzerland

THE American standard terms for the elements of a screw thread as used in this article, are explained by Fig. 1 in their application to a screw and nut, both having the American National Standard form of thread as their basic profile. In manufacturing threaded products, specification of the basic profile, is of course, not sufficient; tolerances must be given and therefore high and low limits have to be established for the several elements of the thread, as for example, the pitch diameter. This question of limits will be dealt with later.

There are at present three systems of screw threads used that cover the large majority of applications in the different industries throughout the world. They are, in the order of the dates at which their basic principles were originated:

1—Threads based upon the Whitworth form of thread devised in 1841 by Sir Joseph Whitworth. This profile has a 55-deg. angle, and the crests and roots are rounded equally. The truncation of the sharp triangle amounts to one-sixteenth of its height. The Whitworth form of thread is applied to coarse and fine threads and to pipe threads. Sir Whitworth also specified a series of nominal diameters in combination with a series of corresponding pitches. These diameters and pitches have been adopted not only as a British national standard, but have also been adopted extensively in Continental Europe.

2—Threads based upon the American National Standard form of thread. This was originally designed by William Sellers and was recommended in 1864 for general use by a special committee appointed by the Franklin Institute, before which body Sellers had presented a paper on the subject. Besides the profile Mr. Sellers specified a series of corresponding pitches for diameters from ¼ to 6 in. This type of thread has also been designated as Sellers thread, Franklin Institute thread, and United States thread, or United States Standard (U.S.S.) thread. The thread will be designated here exclusively as American National Standard thread, or simply National Standard.

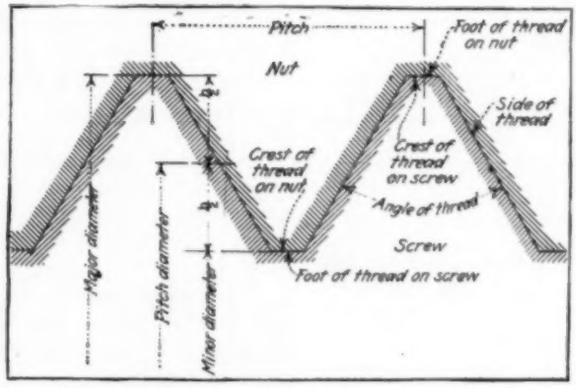


Fig. 1—Screw thread nomenclature

The National form of thread has an angle of 60 deg. and the sharp triangle is truncated one-eighth of its height so that the crests and roots of the basic profile have a flat equal to one-eighth of the pitch. In Fig. 1 this type is shown.

3—A system of metric threads with a basic form like that of the National Standard thread (angle 60 deg., truncation one-eighth of the height of the triangle), was adopted in 1898 at a conference of Continental countries at Zurich, Switzerland. For this reason this thread form is also called the "S I profile" (S I meaning "Système Internationale). Metric threads with the S I profile have been adopted as national standards in several Continental countries and in Japan.

The American Standard B 1a-1924, on "screw threads for bolts, machine screws, nuts, and commercially tapped holes" gives a series of coarse threads ranging from 0.073 to 3 in., and a series of fine threads ranging from 0.060 to 3 in. in outside diameter. Both series have the National form of thread mentioned above. The standard specifies that the symbols NC (National Coarse) and NF (National Fine) shall respectively be used in abbreviated designations for threads belonging to the two series. Pipe thread according to the American Standard B 2-1919 was originally formulated by Robert Briggs, prior to 1882. It has a profile with an angle of 60 deg. and flat crests and roots. The truncation of the sharp triangle is 0.033 pitch, as against about 0.108 pitch, (⅛ height of the triangle) for the National form of thread. The crests of pipe thread are therefore sharper than those of the National Standard thread of the same pitch.

There is also an American Standard B 26-1925 for "Fire-hose coupling screw threads for all connections having nominal inside diameters of 2½, 3, 3½ and 4½ inches." The National form of thread has been adopted for these couplings.

The first of two articles. The second will appear in an early issue.

The great majority of foreign national standards are based on either the Whitworth or the S I form of thread. In Table I the standards existing on April 1, 1927, are listed.

In addition to the standards listed in Table I, threads other than those based on the Whitworth, and the S I profiles, have been standardized in foreign countries, as will be mentioned below.

Foreign National Standards

In *Czechoslovakia,* the Acme thread has been standardized with metric dimensions for a range of diameters from 10 to 300 millimeters.

In *Germany,* national standards have been established for round thread, buttress thread (very coarse, coarse, and fine), Acme thread (very coarse, coarse, and fine; also double), and threads for valves of compressed gas cylinders (right- and left-hand threads). Furthermore, there are German screw-thread standards particularly relating to certain industries as, for example, a standard on threads for sheet-metal radiator caps of motor cars.

In *Great Britain,* the British Association (BA) thread (for diameters from 6 down to 0.25 mm. inclusive, numbered from 0 to 25) is specified entirely in metric dimensions, but does not have the S I profile; its angle of thread is 47½ degrees.

Another British standard gives threads, with Whitworth profile and a taper of 1:16 on diameter, for copper tubes and their screwed connections for low, medium, and high pressures. The nominal bores of the tubes range from ⅛ to 4 inches.

In *Sweden,* the buttress thread ranging from 10 to 300 mm. has been standardized.

In *Switzerland,* the Acme thread with metric dimensions has been standardized for diameters from 10 to 300 mm., as have threads for the watch industry with metric dimensions for diameters ranging from 0.3 to 2 mm. The angle of the latter kind of thread for diameters below 1 mm. is 50 deg., as against 60 deg. (S I profile) for those from 1 to 2 mm., inclusive. This departure from the 60-deg. angle was due to the desirability of compromising between different low values for the angle of thread that occurred in previous practice.

Table I—Foreign Thread Systems with Range of Diameters

Country	Whitworth[1]			Metric (SI Profile)	
	Coarse	Fine	Pipe	Coarse	Fine
Austria	¼–2	.....	⅛–18	1–80	.....
Belgium	¼–3[2]	.....	.....	.....	.....
Czechoslovakia	¼–6	.....	⅛–18	1–149	A:1–204 B:8–204
Finland	¼–6	.....	⅛–18	1–149	.....
France	.....	.....	.....	2.5–115 and upward by 5 mm.	No diameters specified[4]
Germany	¼–6	No. 1:56–499 mm. No. 2:20–189 mm.	⅛–18	1–149	9 kinds, with ranges between 1 and 499
Gr. Britain	¼–6	7/32–3	⅛–18	.....	.....
Holland	¼–6	.....	⅛–18	1–149	.....
Italy	3/16–6[3]	.....	⅛–6	1–80	1–80 (screws) 1–600 (machine parts)
Japan	.....	.....	⅛–18	1–25	.....
Russia	.....	.....	.....	6–68	.....
Sweden	¼–6	.....	⅛–6	1–150	.....
Switzerland	3/16–6	.....	⅛–18	1–150	1–150

[1]Dimensions in inches unless specified otherwise.

[2]There is no special Belgian standard for screw thread, but there is a standard for bolts and nuts in which BSW is specified for these products.

[3]For diameters from 2¼ in. upward, the Italian Whitworth thread has 4 threads per inch.

[4]The French standard specifies that the pitches of the Metric coarse thread shall also be used for the Metric fine thread.

Basis for Interchangeability

Interchangeability as permitted by the basic thread form, the pitch and the diameter of different national standard systems will first be considered. In other words, the question of different kinds of fit depending on the limits established for the two mating parts, and other considerations regarding the fitting together of two mating parts will be disregarded for the moment.

For the interchangeability, as to their form of thread and basic dimensions, of products threaded in accordance with the different national systems, it is evidently necessary that the pitch diameter, the angle of thread and the pitch be equal in both systems. Difference in pitch diameter (as existing between inch and metric threads), difference in angle of thread (as existing between British Standard Whitworth and (American) National Coarse threads) or difference in pitch (as existing between certain metric threads with the same pitch diameter and thread form) will each for themselves prevent a theoretically correct interchange between parts, although practical interchangeability may sometimes occur. This is the case, for example, between certain BSW and NC threads.

With a few exceptions, the Whitworth coarse threads standardized in countries other than Great Britain, are perfectly interchangeable with BSW threads. The exceptions are the Italian Whitworth threads with a diameter of 2¾ in. and upward. The latter have 4 th. per in., instead of the coarser pitches specified for these larger diameters in all other national Whitworth systems.

Interchangeability of Metric Standards

As to national metric standard threads, there is complete interchangeability between all coarse threads with diameters from 6 to 80 mm. There is also complete interchangeability for metric coarse threads with diameters from 1 to 5.5 mm., with the exception of French and Japanese standards, which have certain diameters and pitches within this range that deviate from those adopted as standard by the other countries. In Table II, these are shown.

All national metric coarse threads with diameters above 80 mm. have a unform pitch of 6 mm., but the series of these larger diameters do not agree in all of the countries concerned. France, Switzerland and Sweden have adopted the increase in diameter of 85, 90, 95 mm., etc., while Czechoslovakia, Finland, Germany and Holland have standardized the series, 84, 89, 94 mm. and so on.

The same discrepancy in the larger diameters exists for the standard metric fine threads, adopted in the

several European countries (see Table I). This matter was discussed at an international conference on standardization projects held in 1925 at Zurich, Switzerland, and it appeared that the majority of the representatives favored the series 85, 90, 95 mm., etc., rather than the series 84, 89, 94 mm., etc. Only the German and the Czechoslovakian delegates preferred the 4-9 system, while the Dutch, French, Italian, Swedish and Swiss delegates favored the 0-5 system. It was therefore decided that the matter would again be laid before the several national standardizing bodies in order to see whether the discrepancy could not be eliminated for the sake of international uniformity. Up to the present time, no definite decision has been reached by all of the countries concerned, but it may be well to keep in mind that some of the national standards for metric thread given in Table I will possibly be revised in the future, in so far as the diameters above 80 mm. are concerned.

Table II—Diameters and Pitches of Small Metric Coarse Threads

Nominal Diameter, mm.	Pitch in mm.		
	Austria Czechoslov. Finland Germany Holland Italy Sweden Switzerland	France	Japan
1.0	0.25	.....	0.25
1.2	0.25	.....	0.25
1.4	0.30	.....	0.30
1.7	0.35	.....	0.35
2.0	0.40	.....	0.40
2.3	0.40	.....	0.40
2.5	.....	0.45	.....
2.6	0.45	.....	0.45
3.0	0.50	0.60	0.60
3.5	0.60	0.60	0.60
4.0	0.70	0.75	0.75
4.5	0.75	0.75	0.75
5.0	0.80	0.90	0.90
5.5	0.90	0.90	0.90

As the diameters and pitches of metric standard threads have been established in millimeter dimensions, without relationship to the dimensions of inch threads, it is obvious that interchangeability between metric threads on the one hand, and (American) National Standard or Whitworth threads on the other hand, is out of the question.

Two threaded parts meant to fit together, should bear on the sides of their threads. This is possible only if the angle and the pitch of both threads are sufficiently accurate and if, moreover, the crests of the thread on the screw are prevented from coming into contact with the roots of the thread on the nut, and conversely. In fact, in practical manufacture of most threaded parts, it is impossible to have the threads bear at the same time on their sides and their crests. A very undesirable condition prevails when the threads bear on their crests only, and not on their sides. The fit between the two parts may then give the impression of being sufficiently accurate, whereas actually there is no contact between the sides, which are the only effective bearing surfaces from the standpoint of ability to withstand stresses and wear. This condition, shown in Fig. 2, may be avoided by having both threads dimensioned in such a manner as to keep a certain clearance between the highest permissible crest on one thread, and the shallowest permissible root of the other. With such crest clearance there will never be interference of metal between crests and roots of the two mating parts as long as both remain between their proper manufacturing limits. Only in exceptional cases, for example, when screwed joints require tightness under high pressure, will it be necessary to have practically no crest clearance in order to secure the best possible contact between the two threads along their entire contour.

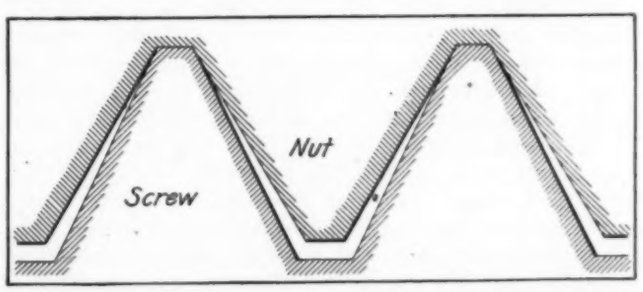


Fig. 2—Threads bearing on crests with error in angles

If the angle of thread and the pitch are correct and proper crest clearance is provided, the nature of the fit between screw and nut depends wholly on the sizes of their respective pitch diameters, just as the fit between a plain hole and a shaft depends solely on their actual diameters. Therefore, the classes of fit in a screw thread system are based in principle on different limits for the pitch diameters and the limits for the major and minor diameters vary accordingly.

Happenings

By Billy Kirby

The president was playing golf, the manager away,
The treasurer had gone along to help him spend the day.
The bookkeeper and all the clerks, "Overhead" a-working,
Were counting on a time like this to do a little shirking.
The draftsmen and the engineers, so eager with design,
Stuck to their reputations—on work they drew the line.
The salesmen were all on the road, the superintendent fishing,
The foreman, now left all alone, likewise got to wishing
That he himself could have some time to do the things he pleased;
He relaxed so much that all his thoughts went breezing while he eased.
Then all the pattern-making tools—with business not so good—
Could see no reason in the world to keep on sawing wood.
The planer hand ran out of work—no foreman could be found—
He lay down on the planer bed, and slept both safe and sound.
The drill presses were next to stop, and then the shapers, too,
Were idle, for not one of them could find a thing to do.
The grinders and the boring mills at last ran out of work;
The traveling crane went swinging by, then halted with a jerk.
The floor hands and the handy men set out to talk things over,
The engineer looked at the gage, and beat it under cover.
For as the whole shop idled on, because of lack of load,
The engine raced, the flywheel broke, and rolled off down the road.
The safety valve refused to work, the boiler, in a stew,
Raged madly 'till it got too hot, and the plant went up the flue.
The moral of this horror is—take heed, as well as listen—
Without the right man in the place, things happen when you're missin'.

Book Reviews

MACHINE DESIGN, CONSTRUCTION AND DRAWING. By Henry J. Spooner. Seven hundred and seventy-five pages, 5½x8½ in., cloth-board covers, illustrated, indexed. Published by Longmans, Green and Co., Ltd., New York City. Price $7.

THE sixth edition of this well known work has been revised, the references have been brought up to date, and new articles have been added. The first edition contained information gleaned from the author's extensive experience and from the technical press of England and America as well as "Der Konstruckteur." It was intended for the use of intelligent beginners and also to be of interest to advanced students. Five chapters were devoted to drawing and the remainder to design and construction. There were tables in connection with the strength of bolts, chains, belts, textile and wire ropes, forgings and various kinds of iron and steel. In four chapters attention was given to the transmission of power by gears, belts, and ropes, and the vexed question of their comparative efficiencies was discussed in another chapter. The latest important developments in spur gearing were described. Such minor details as machine handles, which are usually left to the initiative of the individual, were given a chapter. The often slighted subjects of machine frames and the stiffness of certain machine parts were treated in separate chapters. Ball and roller bearings were also discussed.

All this information has undergone successive revisions and new matter has been added making the present edition a high-grade text that is exceptionally comprehensive.

FOREMANSHIP AND SUPERVISION. By Frank Cushman. Two hundred and thirty-eight pages, 5x7 in. Published by John Wiley & Sons, Inc., New York Price $3.50.

IF ANYONE doubts the increased consideration that is being given to the foreman's place in industry, the number of books being devoted to the subject should be sufficient answer. This volume is issued as a practical handbook for foremen in general, for conference leaders and for supervisors of vocational education, emphasizing the value of conferences as a means of exchanging information. Various methods are taken up in detail and no one can fail to find numerous suggestions that will be of value. The problems are considered from a number of different angles and progressive foremen will find the book of real interest.

THE IRON INDUSTRY IN PROSPERITY AND DEPRESSION. By Homer Bews Vanderblue, Director of the Harvard Economic Service, and William Leonard Crum, Director of the Statistical Laboratory of the Harvard University Committee on Economic Research. One hundred ninety-three pages, 8x11 in. Cloth boards. Indexed. Ninety-two tables and 88 charts. Published by A. W. Shaw Co., New York. Price $7.50.

THIS book has been prepared with the idea that the iron market is an acknowledged "barometer of trade." Practically all manufacturing is dependent upon some branch of the iron and steel industry for the equipment of plants or for raw materials, and a change in activity in the iron and steel industry is transmitted to many other activities.

The material in the book shows an intensive study of the many aspects of the iron and steel industry and market conditions. It is divided into four main sections. The first part takes up in four chapters the subjects of prices and production of iron and steel, treating of data for the entire country. The second part analyzes in eight chapters the regional production of pig iron. The third part is a study of the price of iron and steel scrap, unfilled orders, coke production, net earnings of the Steel Corporation, and demands for iron and steel. The fourth part is a group of three appendices showing technical methods of tabulating and charting of iron and steel records, lists and locations of furnaces, and various supplementary tabulations. The book is not only a work for anyone directly interested in the iron and steel industry, but should also be useful to statisticians in other lines and economists interested in the reactions and cycles of industry in general.

FINANCIAL POLICY IN CORPORATIONS. By Arthur Stone Dewing, associate professor of finance, Harvard University. Twelve hundred and forty-six pages, 6x9 in., cloth boards. Published by the Ronald Press Co., New York, N. Y. Price $10.

THIS book, written by a competent authority on matters economic and financial, a director of corporations as well as a professor of finance, is a business guide of merit. It is thoroughly practical, being replete with examples of actual cases, showing precedent and practice.

To best present the principles that govern the financial courses of corporations, six main divisions are made. Their subjects are: Corporate securities, promotion, administration of income, expansion, failure and reorganization, and investments. The details treated as parts of these main subjects are legion.

As a text-book for the student of business and as a reference book and guide for the business man, "Financial Policy of Corporations" is a remarkable achievement.

ORGANIZING THE DRAFTING DEPARTMENT. By H. F. Church. One hundred and thirty-three pages, 5½x8½ in., clothboard cover. Published by the Ronald Press Co., 15 East 26th St., New York, N. Y. Price $3.50.

RATHER than treating the practice of drafting as intended for the craftsman, the author has directed the contents of the volume to the executive by outlining a plan of organization that includes operating data sufficient to enable the executive to check up on the management of the drafting department. Holding strictly to this task, the book presents first a simple means of determining the drafting needs of an organization, then sets forth the basic factors necessary for operation.

The organization of a drafting department is an undertaking that frequently proceeds inefficiently, which subsequently may require months of experimenting to correct. On this basis, the author lays down rules that should avoid much of this difficulty. Realizing that the busy executive has neither time nor inclination to make an elaborate study of the technique of the drafting department, there has been grouped, for convenience, the essentials of drafting-room organization, together with certain collateral phases of drafting seldom considered by the layman. Of special importance to the new department will be found the descriptive lists of equipment and materials needed.

Importance of Heat-Treating in Tool Building

By FRANK WALDO

Under the jurisdiction of the toolroom, this heat-treating department is laid out so that the work can be handled accurately and economically

HEAT-TREATMENT of tools and dies may be termed a subsequent operation incidental to toolmaking, but at the plant of the Century Electric Co., St. Louis, Mo., it is considered one of the major functions of the toolroom. Uniformity and accuracy in hardness are of vital importance to the class of work handled, therefore, in laying out the heat-treating room, three factors were considered; namely, the furnace equipment, the method of recording heats accurately, and the operating facilities.

The heat-treating equipment, located in a room adjacent to the toolroom, is partitioned off from the machinery so that it is practically in a separate department. The work, which is treated by a specialist, includes the hardening, tempering, drawing and annealing of units such as punches, dies, special tools, cutters and gages, the greater portion of which are parts for press tools. A layout of the equipment is illustrated in Fig. 1. The floor space is approximately 22x24 ft. At the right are located five gas-fired furnaces of varying sizes, four of which are used for work requiring heats up to 1,650 deg. F., the other one being utilized for high-speed steel tools in which heats up to 2,400 deg. F. are required. The only difference in these furnaces is that the one used for the higher heat is equipped with a Carborundum plate instead of one of tile. At the front of these furnaces, in a convenient position, are located two quenching tanks, one containing oil, the other water. Two electrically-heated furnaces, shown at the left, are used for tempering only, and are heated to approximately 1,250 deg. F. Oil tempering of smaller parts is handled by bench equipment, such as gas plates, gas torches and kettles, located as indicated at the upper left. The control table in the center of the room has mounted on it the pyrometers and control switches. The bench at the left is used for the storing of parts to be heat-treated and for completed work as well as for inspection purposes. A general view of the gas-fired furnaces is shown in Fig. 2. The furnace at the left is used only for large work, whereas the other furnaces, all of which are approximately uniform in size, are in daily use. In Fig. 3 is shown the arrangement of the electrically-heated furnaces. The smaller furnace is placed on top of the larger one to conserve floor space. A high-pressure blower,

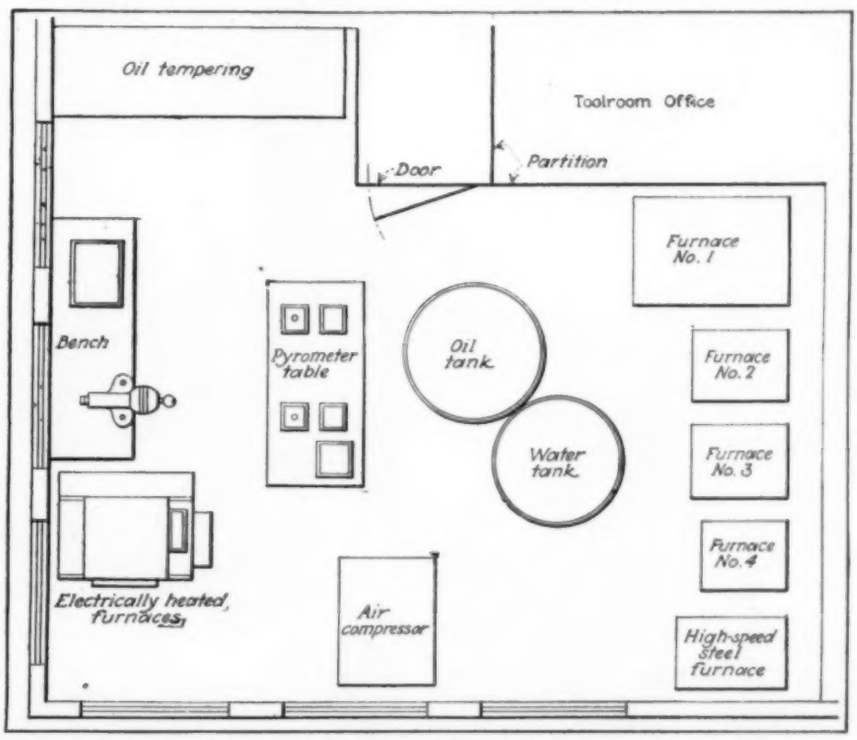


Fig. 1—Layout of the heat-treating equipment

Fig. 2—A battery of gas-fired furnaces

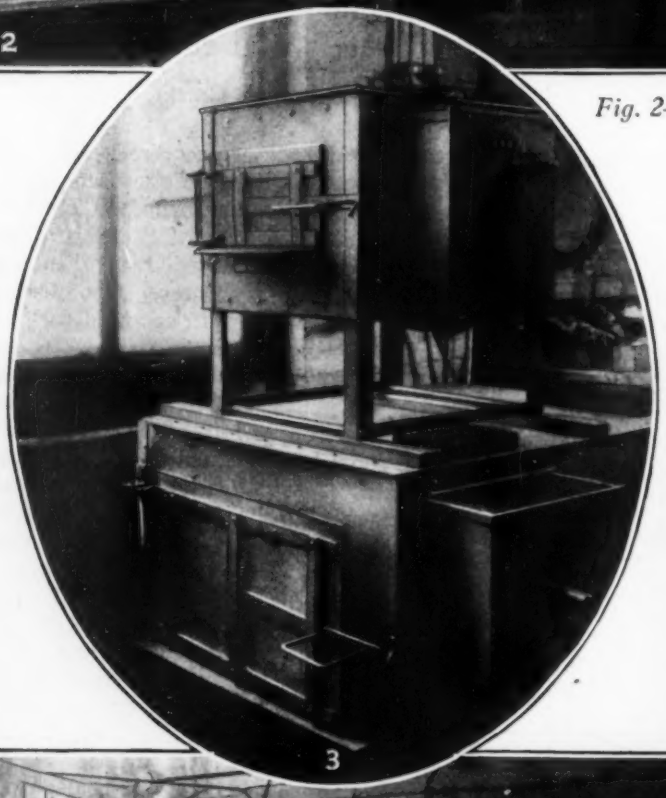


Fig. 3—Electrically-heated furnaces for tempering purposes

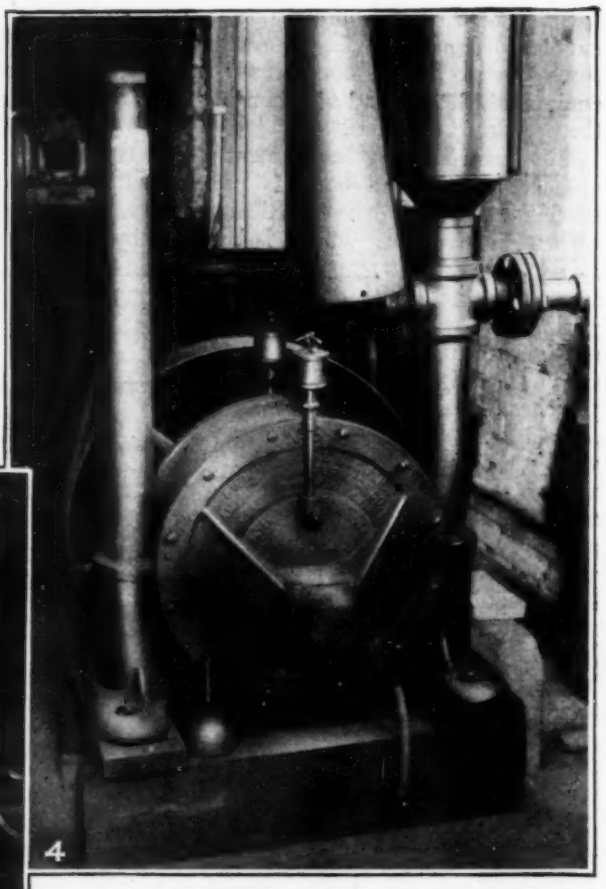


Fig. 4—Auxiliary air supply for furnaces

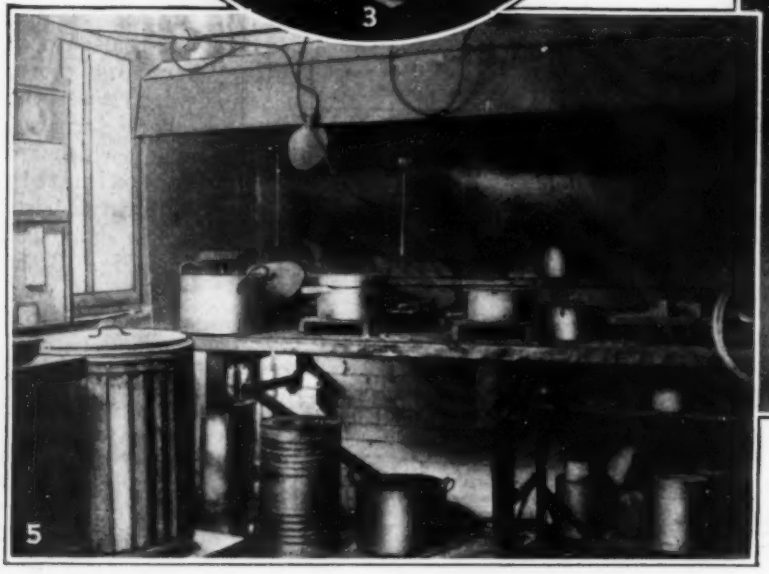


Fig. 5—Tempering equipment for small work

Fig. 6—Pyrometers that check furnace heats

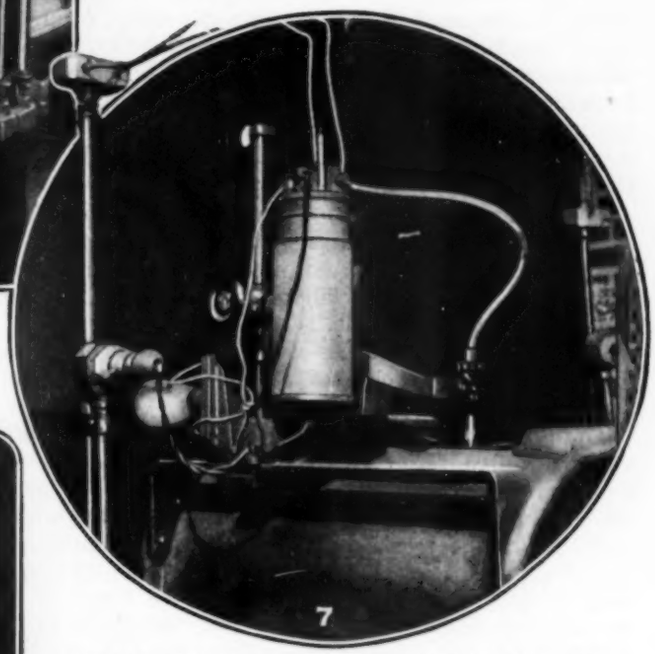


Fig. 8—View of a disassembled thermostatic unit

Fig. 7—Thermostatic unit attached to furnaces

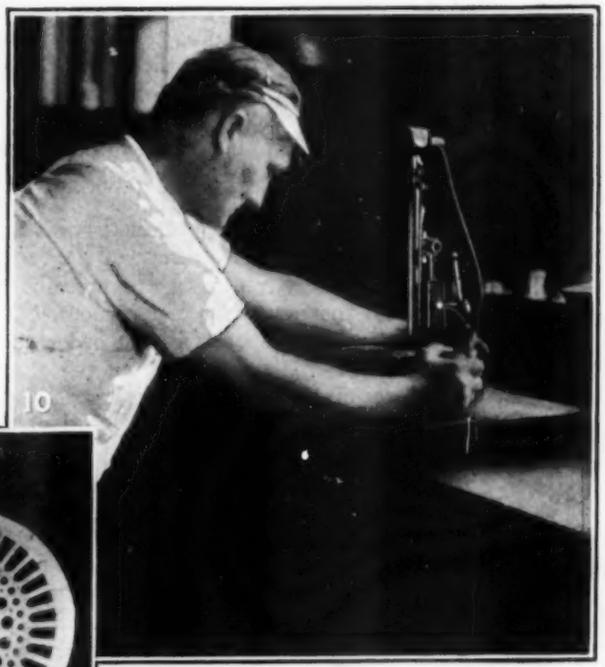


Fig. 11—Examples of dies that must be heat-treated without distortion

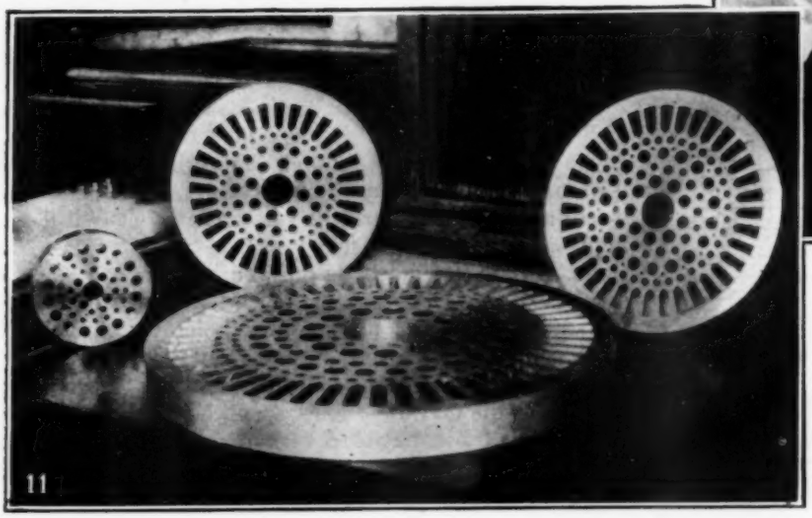


Fig. 10—Inspecting the hardness of a die

used only for emergency purposes, in case the main air supply from the engine room fails, is illustrated in Fig. 4. The blower is driven by an individual motor and has its outlet connection piped to the supply line of the gas-fired furnaces. Gate valves are used to change the supply from one source to the other.

The bench equipment used in connection with oil tempering, is illustrated in Fig. 5. Two gas plates, mounted on the bench, are employed to heat the kettles, one of which contains oil, the other Lavite. The oil-heats vary from 380 to 650 deg. F. When higher temperatures are required, an oil having a flash point of 735 deg. F. is used. The Lavite is heated to 1,200 deg. F. Both gas plates are provided with air connections.

Two indicating-type pyrometers, attached to the table, as shown in Fig. 6, are arranged with control switches so that readings from various furnaces can be made at will. In addition, a recording-type pyrometer, shown at the far end of the table, is used to chart the heat of either one of the furnaces when desired. The heats of the furnaces are checked at approximately 15-min. intervals.

To offset the possibility of inaccurate pyrometer readings that often result from the effect of variations in room temperatures upon the cold-junction point, or upon the connections of the furnace elements with the wires that lead to the pyrometers, a thermostatic-connection unit is attached to each of the furnaces. One of these units is shown in place in Fig. 7, and in Fig. 8 it is shown disassembled. Platinum and rhodium wires coming from the furnace pass within the body of the unit, which is a thermos bottle slightly altered and equipped with a special head, and then are connected to the terminals *A*. To these terminals also are connected the insulated copper wires leading to the pyrometer switch on the control table. Within the body of the unit is placed the thermostat *B*, operated on 110-v. current, and adjusted so that a temperature of 212 deg. F. is maintained. This temperature is checked by the thermometer *C*. The pyrometers are graduated and adjusted to correspond with the temperature of this connection so that the furnace readings on the pyrometer will not be affected by variations in the temperature of the room.

All parts requiring heat-treatment are first inspected for accuracy by an inspector in the toolroom, and are then sent to the hardening room with an order such as shown in Fig. 9. On the order is listed the name of the part, the material from which it is made and the heat-treatment required. The method of hardening and the heats used are left to the judgment of the tool hardener. After the work has been inspected by means of a scleroscope, as shown in Fig. 10, it is then returned to the toolroom inspector who makes a further inspection of it, after which it is turned over to the toolroom foreman.

Examples of lamination dies made at this plant are shown in Fig. 11, to illustrate the nature of the work handled in the heat-treating room. Since the holes and the elongated openings are held to ±0.0005 in., it is evident that proper heat-treating is an influential factor in their accuracy.

CENTURY ELECTRIC CO.

STEEL HARDENING RECORD

O.K. ☐ Cracked ☐ Soft ☐ Distorted ☐ Misc. ☐ Date 6/9/27

Order No. 35222 Name of Apparatus 39 Punches for perforating die.

SC 27 vent. fan inner ring

Brand of Steel and Date Received Drill rod

Hardened by ____ Date ____

Work Hardened O. K. ____ Inspector.

Report on Imperfect Hardening: ____

Harden

Signed Nichols Inspector.

Fig. 9—Order accompanying work requiring treatment

Wages Are Not All—Discussion

By William Stepanoff

IN REPLY to an article by John Homewood, under the title given above, and published on page 920, Vol. 66, of the *American Machinist*, I take the liberty to state that at least one reader, who is a machinist, is not moved by the "glory" of being a machinist instead of a plasterer, bricklayer or anything else. One trade is as bad an the other and in each wages are everything. It is said that a business man is not in business for his health. The same saying fits very nicely the machinist's case: a machinist is not a machinist for his health, or the thrills of caliper fits, but out of necessity. He is compelled to make a bare existence at a trade that best fits his moods.

I would not recommend the machinists' trade, or any other mechanical trade, to anyone, were I to wish him well; for every trade, and the machinists' trade in particular, has few silver linings—most of it is cloudbursts and storms.

It is the reward one gets in the form of wages that makes a trade alluring. It is true that a machinist would probably not be able to stand the hardships of some other trade, but it is also true that a bricklayer cannot be a machinist unless he has the flexible mind of a youth.

When the author of the article referred to says that wages are controlled by economic conditions, he hits the bullseye. It is the law of supply and demand.

Men of the building trades are well organized, while machinists are not. Machinists are highly skilled mechanics, they are the backbone of a nation, but because they are not organized they go shamefully underpaid. The only thrills most machinists get out of the feel of caliper fits and well set-up jobs are unemployment and privation. Everything is specialized today, the all-round machinist is compelled to do monotonous, repetitive work, so there is nothing fascinating about it.

The only thing that will make a machinist feel proud of his trade is a substantial wage, not nominal, but real: A wage that will buy in abundance the necessities of life for his health, study and recreation. Wages, and wages alone, are the thrill he gets from a job well done; high wages are his fascination and the glory of the trade. For, after all, he is only human, the same as his employer, and is entitled to spend a part of his life without calipers and ill-ventilated holes that are called machine shops.

Machinists' wages should at least equal those of bricklayers, for the machinist must spend his time and money learning his trade, buy a set of hand tools that cost about $300 and meanwhile feed his family. The dealers in food, clothing and shelter do not wait.

Reconditioning Locomotives with Modern Equipment

By Frank W. Curtis
Western Editor, American Machinist

Testing stand for reconditioned air motors—Grinding in cylinder heads—Air-operated machines for pipe and pipe clamps—Drilling steel-tired wheels

MANY air-operated tools are included in the equipment of the C. B. & Q. shops, Denver, Colo. The most essential requirement for such devices is that the air motors shall be in good condition, therefore, an effort is made to see that these units operate efficiently and develop the power required. The maintenance of air motors is under control of the toolroom, and is handled by a man who makes a record of all repairs and tests. A printed form provided for this purpose, lists the type of motor, its number, the repairs made, the performance of the test it undergoes, and the date of completion. With this record on file, it is comparatively easy to check the performance and to determine whether or not the motors are being misused, or if they are worn beyond further use.

Air motors, after being repaired, are tested by the prony brake shown in Fig. 12. In testing a motor, 110-lb. air pressure is used, the pressure being checked by the gage *B* connected to the air inlet. The gage *C* records the cu.ft. of free air consumed per minute. Cylinder heads are fitted to the cylinder by the device illustrated in Fig. 13. The head is held against the cylinder by a bar and a coil spring, and is oscillated by suitable connections to the piston in the air-pump cylinder, shown at the right. A coarse abrasive is used. After being rough ground, the contacting surfaces are cleaned, then coated with No. 60 Carborundum and oil for the finish grinding. A joint is completed in two hours. During the greater portion of this time the operator is engaged in other work, since the operation is practically automatic.

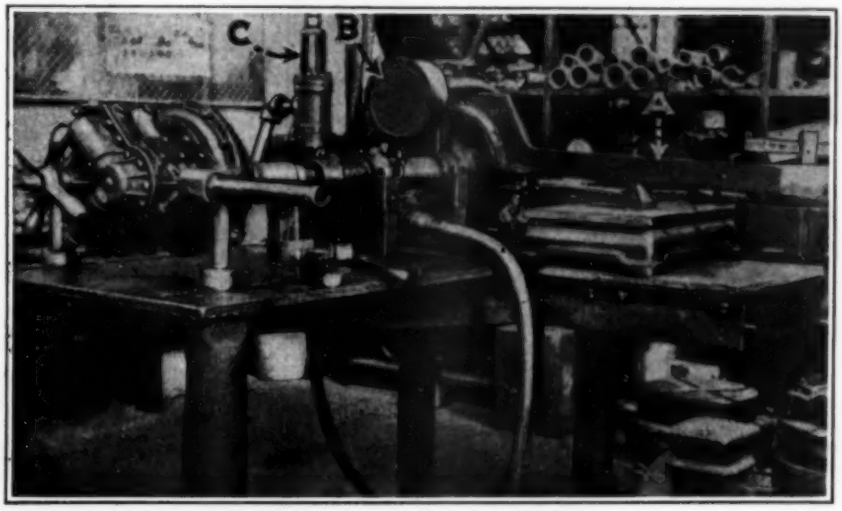


Fig. 12—Testing a reconditioned air motor

A device of value to the pipe-fitting department is the home-made pipe bender illustrated in Fig. 14. It handles pipe ranging from 1½ to 7 in. in diameter. Two dies, of the size of pipe to be formed, are attached to the frame of the machine, and a third die is connected to the piston rod of the 16-in. air cylinder shown at the rear. The pipe to be bent is placed across the stationary dies, after which the movable die is actuated until the bend is of the radius desired.

Pipe clamps, superheater clamps and miscellaneous flat parts are formed and sheared cold in the machine illustrated in Fig. 15. The unit is made of a cast-iron table, supported by pipe legs. On the under side of the table is attached a 16-in. air cylinder, the plunger of which is connected to the lever shown at the left. The upper end of the lever is connected by a toggle lever to the slide *A* that is guided by ways attached to the table. Interchangeable die sets are inserted in the slide and in the stationary member *B*. The material to be formed is placed between the dies, after which the dies are closed by air pressure, completing the form. Prior to the installation of this machine, the work was formed in a machine having the ram connected directly to a movable die, and necessitated heating of the parts to be formed. Occasionally, the metal being formed would crack at the bend, but with the device illustrated this difficulty has not been experienced. The machine is used also for bending jacket bolts and for swaging blower tips.

Tapping headers of steam pipes is an awkward opera-

The third and concluding article.

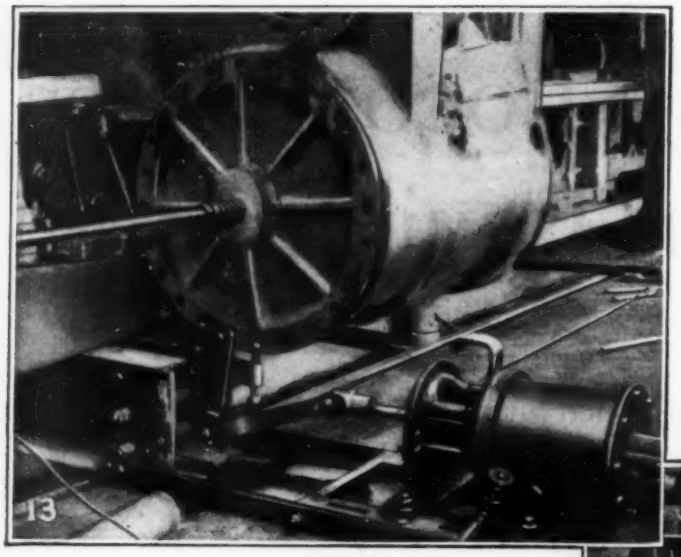
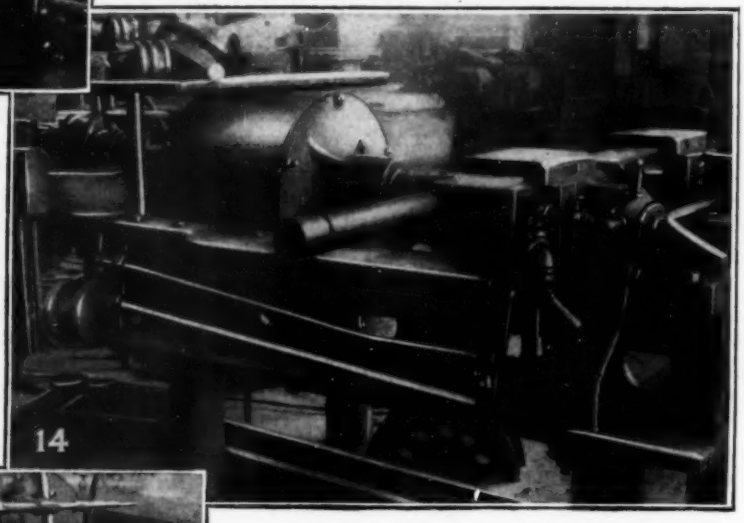


Fig. 13 — Grinding a cylinder-head joint. The head is held against the cylinder by a spring, and is oscillated through suitable connections to the piston of an air cylinder

Fig. 14—Air-operated pipe bender. Dies are attached to the frame of the machine and to the piston rod of an air cylinder. The pipe is held against the stationary dies while the die on the piston rod is brought against it



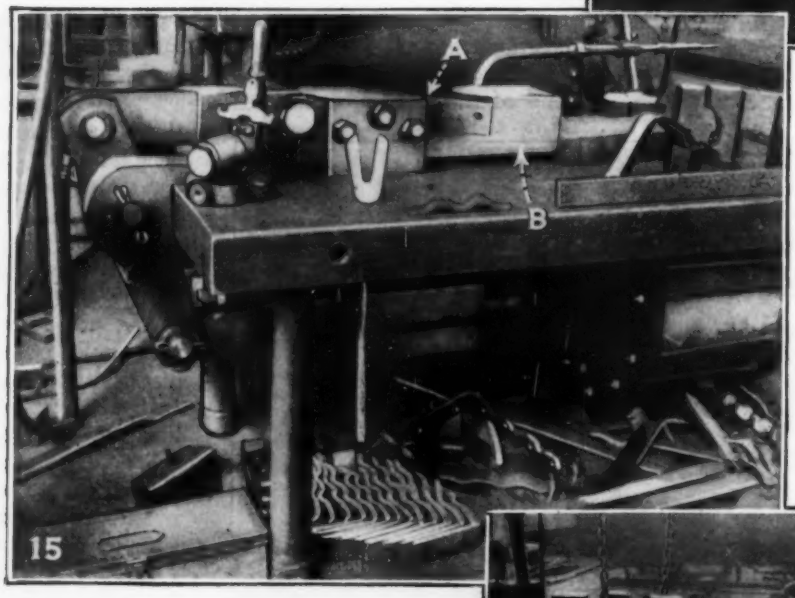
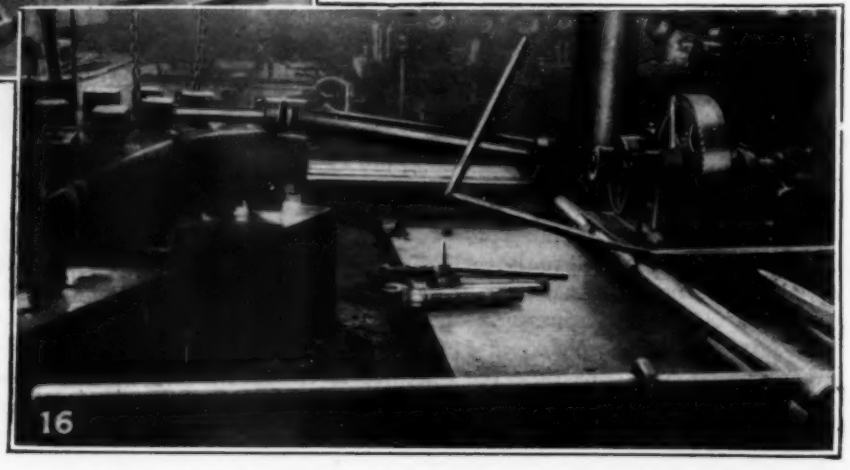


Fig. 15—Machine for forming pipe clamps and straps. The material is placed between opposed dies that are brought together by air pressure through suitable connections to the air cylinder at the lower right-hand corner

Fig. 16—Tapping pipe headers. The machine is driven by an air motor arranged to slide on rails, so as to bring it in line with the holes in the header. Connection from the motor to the tap is by a telescoping shaft equipped with universal joints



tion, due to the odd shape of the pipes. The operation is performed in the machine shown in Fig. 16. The pipes are fastened to the block as shown at the left. In this position, six headers are tapped, after which the pipes are repositioned for tapping the remaining headers. The operating mechanism, consisting of reduction gears driven by an air motor, is mounted on two bars so that it can slide longitudinally, in order to bring it opposite the header being tapped. The tap is connected to the drive gear by a telescoping drive-shaft equipped with universal joints. A reversing attachment is provided so that the tap can be backed out. The machine accommodates taps up to 2½ in. in diameter. White lead is used as a lubricant.

Rivet holes in steel-tired wheels are drilled in the machine illustrated in Fig. 17. The wheels rest on rollers so that they are in line with the spindle *A*. The spindle, driven by a motor in the base of the machine, is

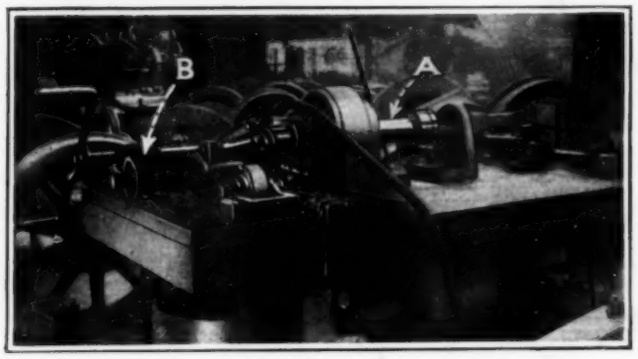


Fig. 17—Device for drilling rivet holes in steel-tired wheels

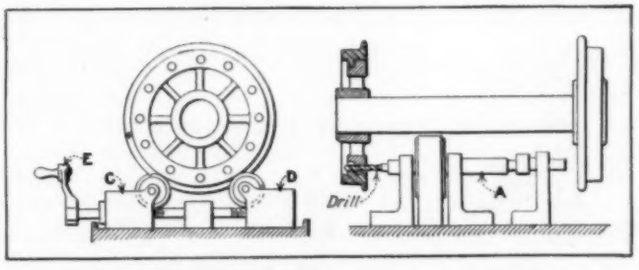


Fig. 18—Details of the drilling machine

fed by hand. In Fig. 18 is a diagrammatic layout of the machine. Adjustment of the slides *C* and *D* by the crank *E*, raises or lowers the work so that it will be at the correct height in relation to the spindle. The wheels are indexed by revolving a knurled roller, contacting with the tire, through the gearing *B*, Fig. 17. After one wheel has been drilled the work is turned end for end, bringing the opposite wheel into the drilling position.

Wages have increased in nearly all industries, giving workmen greater buying power and making possible increased production, which in turn lowers the cost of a product.

It is necessary to create a demand for a product in order to build up a successful business. To force a demand is as bad as the lack of "push."

Seen and Heard

By John R. Godfrey

Exploding Shop Tradition

AMONG the traditions of the shop that have come down from past generations, is the notion that the only proper way to grind valve seats of any kind, is by reversing the motion before completing a revolution. Without reversing, the seat was sure to be "scored"—that is to have grooves running continuously around it. This method has been modified to some extent by reversing after two or three revolutions, but the reversal is still held to be necessary to make a good seat. With a valve of the plug-cock type, grooves might allow liquid or gas to follow around them. But with valves of the mushroom type—as in the automobile engine, it is hard to see what harm these grooves could do, even if they existed. For, unless they connect with each other, they merely divide the seating surface into a number of narrow seats, which might be an advantage.

No Need for Reversing

The proof of the pudding however, is in trying it out, and friends of mine report that as the result of several tests, there is no necessity whatever for reversing the valve in grinding. Valves ground with a continuous rotary motion gave just as good results as those that were reversed. In fact no difference could be detected. In the days when machines did not turn or bore nearly as round as they do at present, it is possible that by reversing the motion before the revolution had been completed, the irregularities were cut away and a better seat secured. But with modern machining methods it seems very probable that valves can be ground in plain machines without the complication of reversing mechanisms.

Another shop tradition that seems destined to go by the board, is one regarding the use of a cutting lubricant on cast iron and brass. In the old days these metals were machined dry, the idea being that lubricant caused the metal to glaze, and the cutting edge of the tool to slide over the surface instead of cutting. The same was true of grinding with anything but clear water, on account of glazing the wheel.

We have learned, however, that there are many cases where a flood of lubricant is a necessity if we are to get good results, and we even find cooling or cutting solutions in which oils play quite a prominent part, being used with great success on cast iron, bronze and similar metals, not only in cutting with tools, but in grinding operations as well. This does not mean that those of us who belonged to the old school were ignoramuses on that account, but that conditions have changed so that these combinations are now effective. Cutting tools are now held more rigidly than before, grinding wheels have changed in many ways, and the amount of metal they now remove makes it necessary to flood the wheel and work to prevent overheating of both.

The sales organization of a concern generally is the backbone through which all channels operate. Lack of co-operation from other departments, however, will cause serious disturbances that will make the backbone weak.

THE · FOREMAN'S · ROUND · TABLE

Using Makeshift Tools

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions at the foot of the page have been prepared

"WONDER what ails Williams this morning, Al? He's generally keen on saving money but he didn't enthuse at all when I told him about an idea of mine."

"What was it, Ed?"

"Why, you know he's figuring on buying a new milling machine for that pump body job. Well, I told how I'd fudged up a scheme for doing the work on that old drill press of ours. And he didn't OK it."

"Williams *is* keen on saving money, Ed. But I guess he didn't cotton to the fudging up idea. He knows that you *could* do the work on that machine, Ed. But he also knows that it would take longer and be less accurate than on a new miller."

"But think what it would save, Al. I believe in using what you have when you can."

"That's what ails a lot of shops, Ed, 'specially old shops. They spend time and money fudging up an old machine that is only a makeshift after it's done. It's necessary sometimes, in a job shop with an unusual repair to be done in a hurry. But it's the poorest sort of economy in a shop where you are making a stab at production."

"But you're making the old car do another year, Al. Why didn't you buy a new one?"

"That car, Ed, isn't a production proposition with me. If it was I'd scrap it the minute it didn't produce, or cost too much to run. But it gets me out in the country with the missus and the boys as well as a new one, even if it has an old-style body and isn't finished in Duco. But it's different in the shop, Ed, where you must have accurate work at a low cost."

"Just wanted to save the company a lot of money, Al."

"I know that, Ed—and so does Williams. But you made the mistake a lot of men do in only counting the first cost. It seldom pays to use a makeshift—though sometimes it's a lifesaver to have a man who can fudge up a quick method. Williams won't forget it, Ed, and he may call on you when some emergency comes up."

Did Williams overlook a good bet in turning down Ed's idea?
Did Al size up his reason correctly?
Did Al's reason for not buying a new car square with his other idea?

All foremen are urged to discuss these questions. Acceptable letters will be paid for. The discussion is not limited to foremen, of course

Discussion of Earlier Topics

Consulting the Foreman on Tool Design

AFTER seeing the plan in operation in two different shops, there is no question with me as to the advisability of the foreman passing on the tool design. But it will sometimes happen that the foreman, although very efficient in his own line, may not have the experience necessary to read a complicated design, and considerable care should be taken to insure his understanding thoroughly the construction and use of tools for which he is to sign the drawing. Then there is the case of the department foreman who is called to approve a tool drawing at a time when the duties in his own department are pressing, and even though he may be anxious to see such drawings may allow himself to use "snap judgment" which he may later regret. There is one other to be considered on the approval committee, and he is the foreman toolmaker. It will be found that his ideas and suggestions will be very valuable to the designer and to the company, as his every-day experience makes it possible for him to see where some locating point, clamp, or other detail can be altered to advantage, or where a slight change in design may save considerable time in construction. Regarding the man who is to use the tool, in a majority of cases special tool operators are not familiar with drawings, and in most cases are not capable of passing either on the design or use of the tool. Moreover, it seldom happens that a tool is used by any one operator. It is, therefore, my opinion that the operator should not in a majority of cases be included on our committee.

—D. W. WRIGHT.

WILLIAMS' plan is such a step forward that not much need be added to Al's arguments in its favor. But as to whether the man should be consulted, many of the men using these tools would not be able to form a true mental picture of the tools and their actions from the sketches, or even from the finished drawings; besides, some would not care to express their ideas or opinions.

If the foreman knows his man to be an intelligent and able worker, whose experience and opinion is valuable, in regard to the particular tool or job, a real good foreman will be sure to consult this man. To consult the able man in such a case is only fair, and an advantage to all concerned. To ask the man to sign would mean to make him partly responsible for work that ought to be done by others higher up, and with higher pay, and therefore would be unfair. The man really gives more than what he gets paid for. He will appreciate the courtesy of considering his knowledge, but since he can only suggest, and not decide, he should not be made to feel responsible by signing any sketches. Whatever is done should be in the presence of the tool designer so that he may benefit by the discussion.

—H. J. GUSTAVE KOPSCH.

THE · NEXT · TOPIC

Refusing to be a Doormat

QUESTIONS

How much unjust criticism should a foreman stand for?

Does the higher executive respect the foreman who protests more or less?

How does such an executive affect the welfare of a company?

Paying the All-Around Man

THE work of the all-around man who has the job of keeping production machines up to scratch, does not come in the category of the repetition job, and often it is as difficult to find the cause of the machine trouble as it is to apply the remedy. Even where a part is broken and must be replaced a good man can often patch up the old part or make a temporary one to keep the machine producing while the replacement part is being procured. It is difficult to estimate the value of such a man. A machine out of action costs the concern more than the actual repair. It represents idle capital, it occupies space in the shop, requires light, and may be holding up machines used for the next operation, or the assembly. Many a good all-around man has become an operator because the return is better. Having the knowledge of how a machine should be treated and the knack of adjustment he will often be among the highest producers, in spite of which he would probably have been of very much more value to his employers taking care of the machines if he were given a return that would give him satisfaction. Since we cannot put him on piecework and pay him so much per machine adjusted, we might treat him as they do the Chinese doctors who get paid while the patient is well, payment ceasing during illness. This payment could take the form of a bonus either on the number of hours that the machines are running, or a percentage bonus on the earnings of the machine operators. In either case when the machine is "unwell" his bonus is stopped automatically.

—A. F. GUYLER, *England*.

I THINK that it is a shame that skilled toolmakers receive less than operators at presses, and everyone knows that this condition exists. Some casually refer to it as a case of supply and demand, but in the interests of the industry we must keep the skilled mechanics, and if we do not pay them they will die as a class even as did the old craftsmen of fifty years back.

As to whether it is advisable to pay one setter more than another is perhaps a different question. One firm I know of pays setters by a special piece work system which quickly weeds out the weeds from the corn and

keeps the men going as well as does the ordinary system for the operators.

Wherever a man shows a keen interest in his work and thus becomes more efficient it is wise to increase his remuneration if this can be done without causing trouble. If for certain reasons an increase seems inadvisable, the man should be transferred to another department where he will have more scope for his abilities.

Hiring Back the Fired Workman

THE Grogan-type of workman can be found the world over, and provides a continual problem for many foremen. Personally, I agree with Al's view. Usually these men are excellent workers, otherwise there would not be any problem to solve. The foreman must adopt means to cure them, and, if possible, make them a valuable asset to his department. Often, the only method to accomplish this is to discharge them, but before doing so the foreman must make up his mind definitely that as far as he is concerned such discharge is for all time, and act accordingly. The workman may be gone for ever, but should he realize the mistake he has made and seek re-engagement, it may safely be assumed that he has been humbled, and, given a second chance, it will have a far-reaching effect for good on all workers in general. —F. P. TERRY, *Ireland.*

Looking Beyond the Department

A FOREMAN is undoubtedly a specialist, and the larger the establishment in which he is employed the narrower the scope of his duties tends to become. Nevertheless, a specialist is one who knows a little about everything and all about one thing. So with the foreman; he ought to know a little about the work of every department, and all about that of his own, taking care, of course, to avoid spreading himself out too thin in the acquisition of the general knowledge.

—S. C. MILLER, *Mechanical Engineer.*

THE foreman's interest in the firm should have been aroused sufficiently by the management so that he has an appreciation of the relationship of the various factors making for a profitable business. In addition, the man who does his own work well, and still can do some original thinking on related matters not directly chargeable to him, is certainly building himself a secure foundation for his future with the company. The finished product, intelligently considered from the consumer's viewpoint by a man grounded in the details of production, may often be greatly improved by a single worthwhile thought. And it is necessary to get out of the shop into the advertising pages, the store window, or the mechanical exhibit to see some of these points.

—MICHAEL J. KAPLAN.

EVERY foreman should be interested in the output of his company, and to be successful he must look beyond his own department. If he does not, he cannot understand the work in the department of which he is foreman, and he cannot hope for future advancement.

A good foreman will not wait until his boss tells him the production costs are too high, but will study every way to cut the cost of production, and in the meantime help make the product better. A good foreman should be able to go ahead without consulting his boss too much, and asking unreasonable questions. He must not be just an employee of the company but must be a part of it.

The big boss should point out the mistakes of the foreman, but in a mannerly way, and help him correct the mistakes. He should see the good things the foreman does, and not all the wrong things. Everybody knows that a man will work harder when he knows his work is being appreciated. —M. V. DUMIRE.

THAT the first job of a foreman is to get the production of parts at a minimum cost must be taken for granted. Yet, he should go further and interest himself in the finished product and other related affairs which are not strictly a function of his department. Many a time, when a foreman is inclined to question or rebel against his orders, it is a situation that is caused only by the narrowness of his judgment. If he understood better the policies and the relationship of the various divisions to the whole, he would see the wisdom of these orders, or at least appreciate that there must be a practical reason behind them. Then too, the qualities that brought about the foreman's rise from the ranks, namely those of observation of the other fellow's job and learning the reason for doing things a certain way, are his chief assets. So, why not encourage him to continue to develop these qualities so that some day when a need arises for a new superintendent, he will not be passed by merely because he only knows the work of his own department. —GEO. W. HARDMAN.

Arguing with the Big Boss

IF THE boss is a Big Boss in the big sense, he will welcome helpful suggestions. Generally speaking, the better and bigger a boss he is, the more ready he is to consider first the interests of the business. Consequently he is glad to receive hints that are the outcome of serious thought and useful experience. If the foreman has a good idea, or knows of a good device, or can suggest a simplification on method, service, or procedure, he should not let bashfulness hold him back. He, too, needs to put the interests of the company first. Let both boss and foreman be straight, honest, and fair, and only good can accrue. It is generally only little men who discourage initiative. Tact and what Lancastrians call gumption are prime requisites. The thing for the foreman to remember is that he should see to it that his opinions are worth recording. Not any immature, half-baked, ill-considered suggestion which may occur to him, but something worthy of himself, the boss, and the importance of the job, should be the thing he introduces and pleads for. He needs to learn the art of thinking things out, of getting hold of practicable ideas, and especially of presenting them at the right time and in the right way. He needs to study his boss. He also needs to remember that even his seriously considered proposals may have a snag in them somewhere, and he should not sulk, or allow himself to feel disgruntled, if suggestions are turned down. He should, however, make so sure of his ground that he can do himself justice and give a good wrinkle a working chance of making good.

—W. MARDY, *Foreman, England.*

Ideas from Practical Men

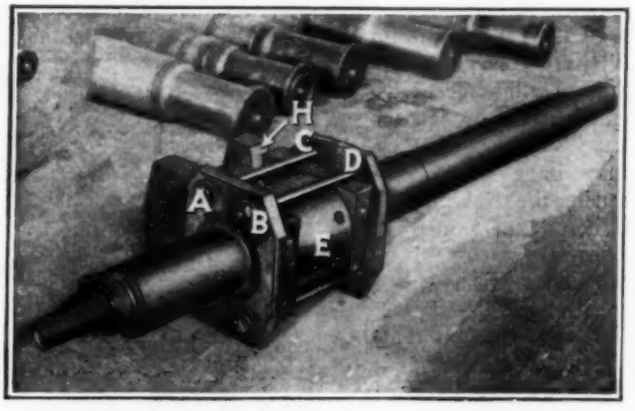
The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upward, depending upon their merit.

Crankshaft Repair in Cuba

By Frank C. Hudson

Welding and cutting with the flame or arc apparatus, seems to have found its way into most sections where machine shops are in operation. Here is a case where a broken air-compressor crankshaft was put back into commissioned, in a railroad shop in Camaguey, Cuba. First the clamping pieces *A, B, C* and *D* were cut from boiler plate with a torch and were drilled for the clamping bolts. Then the thimble *E* was faced the right length to fit between the crank cheeks and hold them the proper distance apart. The sides of the break in the crank cheek were then chipped out to form a good opening for the welding in of new metal, as at *H*, and the crank was clamped together.

With the parts firmly clamped together as illustrated,



Crankshaft clamped for welding a break in the cheek

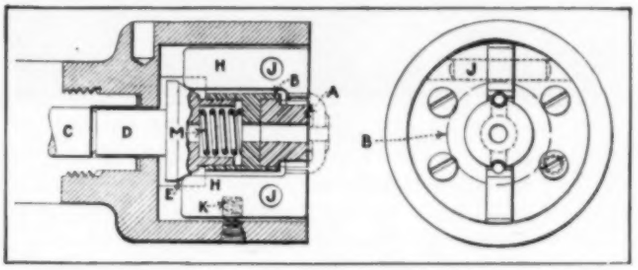
it was not a difficult job to fill in the gap with new metal using the arc welder, and the crankshaft was ready for replacement before a new one could have been obtained.

Special Chuck for a Screw Machine

By B. J. Stern

The sketch illustrates a chuck used on a hand turret lathe for holding small brass castings while being machined. Each casting is finished on the outside of the hub and a hole is then drilled and reamed through the center of the hub.

The casting is inserted in the chuck so that its two round, projecting ends are seated in corresponding half rounds in the hardened bushing *A*, driven into the sleeve *B*. The face of the bushing acts as a stop for the casting. The chuck-closing lever of the machine being pushed back, causes the rod *C* to move forward, striking



Chuck for holding small castings in a screw machine

the actuating plug *D* which has a tapered end *E*, as shown. The plug being pushed against the pressure of the spring *M*, its tapered end strikes the two jaws *H* which are thus caused to turn on their pivot pins *J*. The insides of the front ends of the jaws are formed in half rounds to fit the casting projections, so that when the jaws are closed, their ends grip the projections and hold the castings tightly. The jaws fit and pivot in slots cut in the sleeve *B* which is a fit in the body of the chuck, being secured to the latter by screws. The body is threaded at the back to fit the spindle nose. The spring *K* throws back one of the jaws when the operation is over and the pressure has been released, thus allowing the work to be removed easily.

Catching Flying Planer Chips

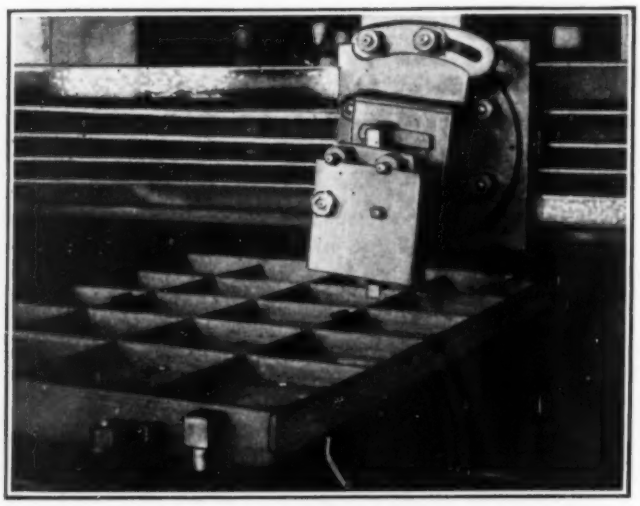
By Donald A. Hampson

The illustration shows a simple and effective guard against accidents that may be caused by workmen being struck by flying chips from planer tools. For clearness, the tool has been lowered so that it shows below the guard. In use, this difference in height does not exist, since the guard just nicely clears the work.

When planing steel, the operator has to avoid the long, curly chip that comes writhing toward him like a hot, two-edged serpent; when planing cast iron, semi-steel and some of the yellow metal castings, the chips are short pieces that may fall where they are cut, or, according to the composition of the metal, be shot away from the tool in a more or less continuous stream, directed at an angle depending upon the grinding of the tool.

The continuous flow of chips is not often dangerous to workmen in the vicinity of the machine. But there are planing jobs where the chips from even a soft grade of iron may be a serious menace to safety. This condition exists where intermittent surfaces are planed, such as the one shown in the illustration.

Here light ribs are cut over, and while no great depth of cut is being taken, the spring of the tool and that of



Chip guard for the planer

the part being cut, results in the chip being thrown with considerable force. As the hardness of the casting increases, the risk increases also. By being dexterous, the planer hand may avoid getting hit, for he is on the watch, but others in the vicinity do not have the same chance of protection.

With the guard, all risk is avoided. It has an ample front face and the sides are turned far enough back to catch chips flying in any of the three directions. The guard is made of $\frac{1}{16}$-in. sheet steel, and is held by a nut tightened only by the fingers.

Press Tools for Making Small Caps

By Atol Maker

The press tools for making small caps, such as the one shown in Fig. 1, were built on the strength of a small order, therefore they were made as cheaply as possible. The caps were of 0.018-in. sheet brass. The blanking tools, Fig. 2, punched one blank at each stroke o fthe press, necessitating feeding the stock through them twice in order to utilize the full width of the strip.

In the first drawing, the blanks were located by the nest in the die in Fig. 3. This die was necessary because of the teat to be formed at the top of the cap. Since the drawing action in this die was not severe, the corner A was only slightly rounded. The blank is shown at *B*, while at *C* it is shown after the first draw. After annealing, the caps were brought to the final shape, except for piercing the holes, in the tools shown in Fig. 4. This die functioned satisfactorily without any nest.

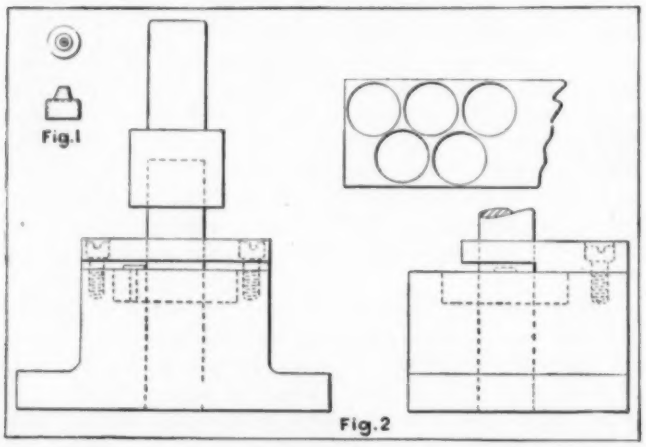


Fig. 1—Small brass cap to be made. Fig. 2—The blanking tools

In operation, the caps were laid in the die in approximately the correct position. Any slight error in position was rectified by the corners of the punch *D* and the plunger *E* coming in contact with the inner and outer sides of the caps, as shown in Fig. 5. In this view the descending punch has aligned the caps, as described. Further downward motion of the punch will depress the plunger *E*, Fig. 4, and the side wall of the cap will be drawn. When the plunger *E* strikes the hardened anvil *H*, the pressure on the cap will be great enough to iron out any wrinkles that may have formed during the drawing. When the punch rises, the spring *J* pushes up the plunger, ejecting the cap from the die and causing it to stick to the punch, from which it is removed by the stripper *K*. The die block *L* protrudes about $\frac{1}{32}$ in. above the face of the bolster, and the stripper is recessed at the bottom so that it fits over the die and holds it in place in the bolster. Because of this construction, the stripper and the die align themselves each with the other, and no dowel pins are necessary. In addition, the stripper serves to align the punch and die when setting up the tools, and to support the punch during the drawing operation. *M* and *N* represent the cap before and after it has been drawn.

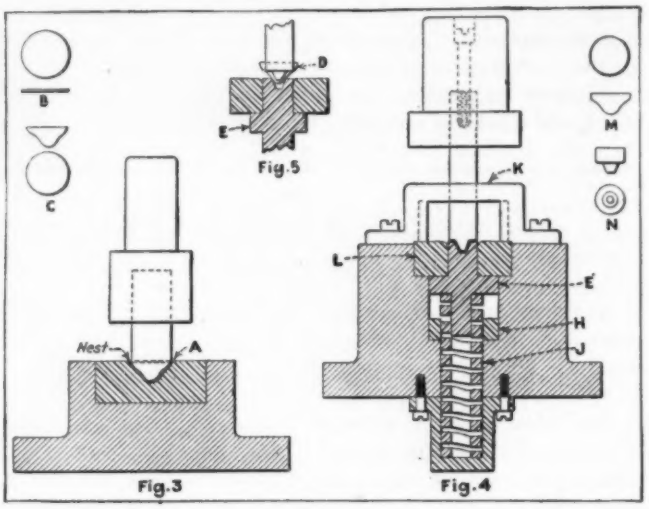


Fig. 3—First drawing tools. Fig. 4—Tools for the final drawing. Fig. 5—Method of aligning the work

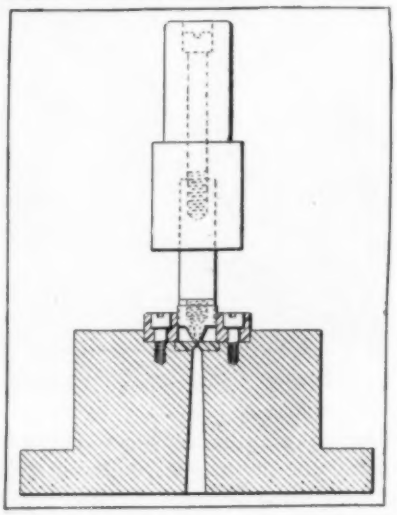


Fig. 6—Tools for piercing the hole

The caps were pierced by the tools shown in Fig. 6. The die proper is a thin disk of steel. The hole is countersunk from the bottom, so that it was unnecessary to taper it. The piercing punch is held in the holder by a cap screwed to the threaded end.

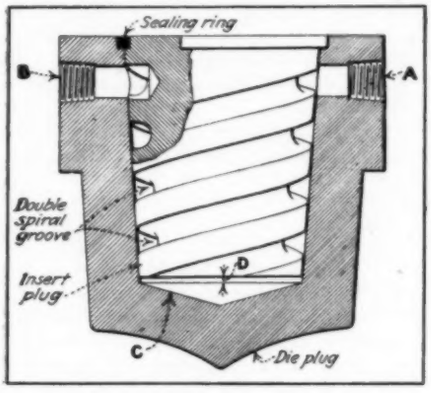
Heating a Die Plug

By John Wynd

In some branches of manufacture, such as in Bakelite, celluloid, and the like, where articles are formed by dies under hydraulic pressure, it is desirable and very often necessary to heat the die plug. This can be accomplished very satisfactorily in most cases, by adopting the following method:

Bore out the inside of the die plug on a taper, as shown in the sketch. An insert plug is then machined to fit the tapered bore of the die plug. On the insert plug is cut a double helical groove. It is then fitted tightly into the die plug, and welded at the top to seal it, or, as shown in the sketch, a brass ring is hammered into a slightly tapered groove, thus very effectively sealing the two plugs.

An inlet pipe connection is made at *A* and an outlet pipe connection at *B*. This is done by drilling holes through the die plug to meet the beginning of the helical grooves on the insert plug. The holes are then tapped to take any convenient size of pipe. The steam enters at *A* and circulates around and down one of the helical grooves until the cone shaped pocket *C* at the bottom of the plug is reached. Here the steam enters the other groove and returns up the plug to the pipe *B* which is the outlet or exhaust connection. Clearance *D* at the bottom of the insert plug is necessary in order to allow the insert plug to firmly seat itself in the tapered bore of the die plug.



A die plug that can be heated or cooled

The taper surfaces should fit very snugly, otherwise, some of the steam will enter the return groove without taking the intended path.

It is often desirable to cool off the die plug after the article has been pressed. This device can also be used in cooling the die plug, by simply allowing cold water to flow through the grooves in place of the steam.

Safety Devices for Ladders—Discussion

By M. W. Taylor

I have read with interest two articles that have appeared lately in the *American Machinist* relative to safety devices for ladders. However, I have worked in shops where there were very smooth cement floors and where prongs of any kind would not be entirely safe. On such floors, prongs will dull up quite frequently and, generally, the hand-filing operation of the prongs will not take place until after someone had received a fall. When used on wooden floors they make innumerable holes, which are considered unsightly in a well-kept factory.

I have in mind an anti-slip device that was used successfully in a factory in Massachusetts for a number of years, without a single case of slipping. Two ordinary plumber's rubber plungers, such as are used by the average housewife for cleaning out a drain pipe in the kitchen sink, were attached to two legs of the ladder. The moment the foot was placed on the bottom rung of the ladder, sufficient pressure was applied to create the necessary vacuum. Pulling the ladder up from the floor was an easy task. A quick jerk accomplished this result. If the floors happened to be oily, such as is the case in the average screw machine department, the plungers had to be replaced about once a year, at a nominal cost.

Grinding Brass Tubes on the Centerless Grinder

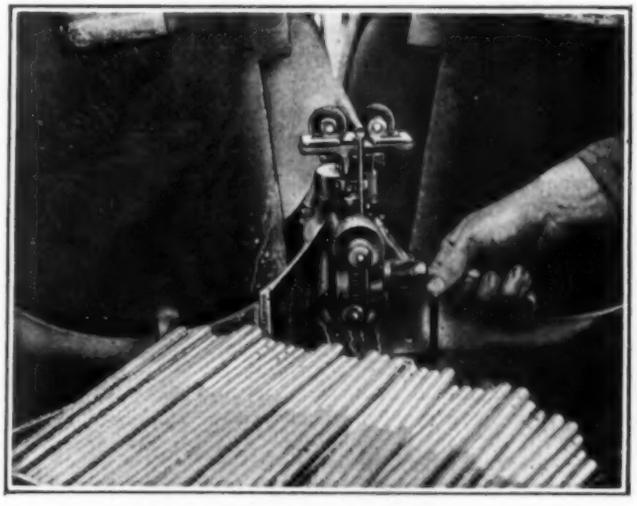
By John W. Leahy

A number of brass tubes ½ in. in diameter had to be reduced to accurate size and roundness for a distance of 4 in. from one end to make a smooth sliding fit for other tubes with reamed bores, to fit over them. The frictional resistance of the sliding joints was required to be sufficient to keep the outer tubes in whatever position they might be left but not enough to interfere with frequent and easy adjustment.

The work was done on a Heim centerless grinding machine fitted with a standard work-holding attachment. A stop at the inner end of the attachment determined the final position of the tube endwise and consequently the length of the part to be ground, which was slightly less than the width of the grinding wheel. The outer end of the tube was supported by rollers, as may be seen in the illustration.

The operation was conducted by laying each tube in turn on the supporting rest while the latter was raised above the grinding position, and then lowering it to contact with an adjustable stop by means of the hand lever to be seen in front of the machine.

The axis of the regulating wheel was adjusted to parallelism with that of the grinding wheel so that there would be no tendency for the work to advance endwise, and since the grinding position was just above the level of the center line of the wheel spindles, the diameter of the work could be controlled by adjusting the vertical stop. The maximum variation in diameter and roundness of the finished pieces was less than 0.0002 in., and the amount of stock removed was about 0.010 inch.



Centerless grinding brass tubes

Technical Abstracts

Measuring Brinell Hardness Numbers

Experiments have shown that the hardness numbers obtained in Brinell machines differ according to whether the diameter of the impression is measured under load or unloaded. The chief cause of this discrepancy is elastic recovery not only of the impressed portion but also of the surrounding surface.

According to the nature of the material, the metal either piles up around the ball or depresses in a wavy form. Since both effects are due to plastic flow, it is not reasonable to measure the apparent diameter of the impressed circle after removing the load, but to calculate its diameter from the depth of depression below the original surface while under load. If this method of measurement is used, the hardness numbers of quenched steels are reduced by nearly 50 per cent.

Comparison between Brinell numbers and scleroscope, impact hardness, and pendulum hardness numbers showed a more nearly straightline form on the basis of measurement under load (in the case of Brinell numbers) than unloaded. It is therefore suggested that the definition of Brinell hardness should be the ratio of the applied load to the surface of the impression under load. The diameter can be calculated from the depth of depression which can be measured with present instruments with sufficient accuracy.—Prof. K. Handa and K. Takahasi, *Engineering*, June 10.

Five Industrial Cities Unite to Train Apprentices

The Tri-City Manufacturers Association has selected a plan for training apprentices in the industrial center comprising the five cities of Davenport and Bettendorf, Iowa, and Moline, East Moline and Rock Island, Illinois.

A committee of the association was formed, the duties of which consisted in establishing policies and sponsoring the success of the program. Sub-committees were appointed to deal with the various phases of shop work, and an educational committee was formed to deal with problems and policies of school work. A uniform indenture was adopted by the general committee.

The separate committees passed on the wage scales for the various trades, and the special conditions arising. Provisions were made for accepting grade school, high school and college graduates and adult specials. Ideal work schedules covering the different trades and showing the number of hours to be spent on the different operations were drawn up and passed upon.

With policies adopted and passed by the Apprenticeship Committee, the plants were surveyed to see where apprentices could be used to advantage, and to determine the number required to overcome the turnover from death, promotions and other causes.

Each employing plant then appointed an apprentice supervisor to have direct charge of the program and its results in his particular plant. These supervisors also plan outside activities for the boys and act as guardians to the apprentices, molding the character of the boys, as well as directing their training.

In recruiting apprentices, the boys then employed in the shops were interviewed first. Boys whose fathers had been in the employ of the plant for some time were given second consideration, providing their qualifications were satisfactory.

School board co-operation was secured, and publicity helped to produce results. In one year there are over 100 boys at work in various trades under this system—S. M. Brah, *Iron Trade Review*, June 30.

Apparent Present Tendencies in Airplane Design

At no time during the history of aviation have there been successful airplanes of so many different types—aero-dynamic and structural. The tendency of airplane design seems to be scattering in all directions.

England has no welded structures, while we use welded fuselages almost exclusively. Fokker developed the welded steel-tube fuselage structure in Germany, and still uses it. In the United States we followed him, but Germany did not, nor has any other nation. France has wooden fuselages and wings of metal construction. We have metal fuselages and wooden wing structures.

England uses little duralumin, Germany uses little else, France uses some, we use a little.

England is for biplanes, Germany prefers monoplanes. England's biplane has thin wings, usually with two-bay cellules. Our biplanes are usually single-bay with moderately thick wing sections.

Several types of monoplane are in use: the Fokker pure cantilever, tapered in plane and in depth; the cantilever with Rohrbach wires under initial tension; the Dornier semi-cantilever with constant chord and depth, braced underneath by diagonal tension-compression struts and the semi-cantilever with diagonal struts with taper in depth and diagonal or chord from root to tip. There has been a leaning toward the Dornier type in France, Germany and lately in the United States.

While welded steel construction is probably cheaper for small production, it may be that riveted duralumin construction can be so tooled up as to be cheaper for larger production.

With monoplanes there is a possibility of carrying a greater useful load per hp. than with biplanes. Again, with monoplanes passengers can obtain a better vision downward, as there is no lower wing to interfere.—V. E. Clark, *Mechanical Engineering*, July.

Coolant System for Machine Tools

Two of the greatest improvements made in the metal working industry are the introduction of high-speed steel for cutting tools and the development of the grinding machine for the rapid and accurate production of parts. To obtain the maximum results from either it is necessary to have a good system for supplying the cutting tool or wheel with cutting oil or lubricant. It may seem unnecessary to call attention to this factor, yet from an examination of the coolant systems often found on machine tools it is evident that there are many opportunities for improvement.

The value of a large quantity of coolant delivered at a low velocity has been realized and provided for by the grinding machine makers. One of the difficult problems in designing a coolant system is to make suitable provision for the removal of sediment. The writer has used one machine on which, in order to clean out the coolant tank, it was necessary to remove the pump and belt, the grinding wheel guard and the wheel. This operation required considerable time, and it could have been avoided by providing some form of removable tank, mounted on wheels.—E. G. Bishop, *Machinery*, June.

Abrasives in Automobile Manufacturing

That the automobile manufacturing industry and grinding machine development are closely related is shown by an inspection of almost any large motor-car building plant; for in such a factory will be seen over a score of types of grinding machines. This is a far cry from a generation ago, when such machines consisted, roughly, of but two types; cylindrical and surface grinders.

Early machines carried small wheels—a wheel 12 in. in diameter by ½ in. face being considered large—and fine traverse feeds were the rule. Today, wheels 36 in. in diameter are in common use on precision grinding machines, and in place of the fine traverse feeds of other days many present-day grinders are capable of finishing massive units from rough stock.

Present-day abrasive equipment in the automobile factory falls under three general heads—cylindrical, internal, and surface grinders; while a multiplicity of special machines have been developed for specific purposes.—Fred B. Jacobs, *Abrasive Industry*, July.

Metal-Working Machinery Production in 1925

Compiled by the United States Bureau of the Census

	No.	Value Thousands of Dollars
Machine tools, total	.....	91,459
Bending machines	807	642
Boring machines		
Horizontal	583	1,688
Vertical	219	1,344
Broaching machines	435	540
Cutting-off machines		
Rotary cutter type	250	294
Hacksaw type	1,536	202
Drilling machines		
Multiple-spindle	1,211	2,110
Radial	831	2,040
Sensitive	3,577	1,776
Vertical (upright)	2,529	1,120
Forging machines		
Bolt, nut, and rivet	18	220
Bulldozers and other	67	560
Gear-cutting machines		
Generator, hobbing type	647	2,026
Formed and disk cutter types, and other	624	2,233
Grinding machines		
Cylindrical		
Plain	....	3,136
Universal	330	509
Surface	894	1,467
Cutter, tool and knife	1,548	1,770
Internal	765	2,005
Other	....	1,848
Hammers, Stationary		
Drop	201	408
Steam, air and other power	654	422
Lathes		
Engine	5,165	7,676
Bench	930	398
Turret, including hand-screw machines	1,567	4,155
Other	....	4,116
Milling machines		
Hand feed	450	208
Power feed		
Plain	723	1,625
Universal	599	1,361
Vertical	333	860
Lincoln type	374	679
Planer type	121	1,022
Other	....	734
Pipe cutting and threading machines	2,637	1,305
Planers	193	1,105
Portable tools		
Drills, electric and pneumatic	92,558	4,097
Hammers, pneumatic	53,104	6,050
Grinders, electric	18,500	1,122
Other	....	627
Presses		
Hydraulic		
Bending and forming	1,015	1,592
Forging	38	81
Power, for sheet-metal work	....	6,322
Punching machines, stationary	1,034	1,910
Riveting machines, stationary	....	688
Screw machines, automatic		
Multiple-spindle	1,140	3,972
Single-spindle	1,161	1,948
Shapers	1,125	1,615
Shears (power)	1,892	1,351
Slotters	62	405
Threading machines (except for pipe)		
Die type	153	171
Milling type	81	344
Tapping machines and rolling type	336	324
Other machine tools	.....	5,241
Metal-working machinery, other than machine tools, total	.....	47,353
Rolling-mill machines	.....	15,001
Sheet-metal working machines	.....	17,468
Welding machines	.....	1,176
Wire-drawing machines	.....	671
Wire-working machines	.....	2,142
All other	.....	10,896
Metal-working machinery, industry, all products	.....	175,592
Metal-working machinery	.....	118,044
Parts and attachments for:		
Machine tools	.....	32,193
Other metal-working machinery	.....	410
Custom work and repairs	.....	3,892
All other products	.....	21,054
Metal-working machinery, secondary products of other industries	.....	20,768
Metal-working machinery, total all industries	.....	138,812
Total value	.....	$196,361

According to the United States Census of Manufactures taken for the year 1925, the total of metal working machinery manufactured during that year was valued at $196,361,000. Above are the details of the 1925 metal working machinery production made public for the first time. The figures are more than a year old, but they serve to give a picture of the production of metal working machinery in this country. By reason of the fact that the Census Bureau reclassified several of the items for this census, a reliable comparison between 1925 and former census years is not possible. The next census of this nature will be taken at the close of the present year.

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

Established 1877

Is the Sherman Law Obsolete?

HAS the time come to amend or abolish the Sherman anti-trust lay? Is unlimited competition the best thing for the ultimate consumer? Does the use of the cartel system in Europe demand that equal freedom to combine be given to American industrialists? How can we square the regulation of rates, up as well as down, for common carriers on land and on water with the restrictions of the Sherman law on commerce and manufacturing?

A book could be written in answer to such questions. Perhaps this much can be ventured here —that the time has not as yet arrived for the relief of business from all restraint. The extent to which some men have gone to circumvent the law is sufficient evidence. Also, that competition does unquestionably stimulate men and companies to refinements of method and displays of inventiveness that would not occur without pressure. The cartel system has not so far proved sufficiently effective to cause serious worry although it may prove more successful in the future.

Could the revision of the anti-trust law be entrusted to other hands than those of politicians, amendment would certainly be advisable. As it is, there is a grave chance that the political tinkers would make it worse than ever. The ideal solution would be a revision that would take account of the fact that the United States contains producers as well as consumers and that the producers are as much entitled to good government as are the consumers. Attainment of the ideal is possible if those who seek it come into court with clean hands and adopt a reasonable amount of organization for their efforts.

Eliminating the Messy Jobs

GETTING rid of the dirty and laborious jobs seems to be one of the present very creditable tasks of the mechanical engineer, and many an inconvenient job that was formerly the butt of the machine shop is now done better and quicker by machinery.

One of the latest developments of this class is a curve oiler at work on the street car lines of the New Orleans Public Service. Anyone who has ever lived in a city is familiar with the oiler who traveled from corner to corner dipping a wad of waste into a pail of heavy oil and swabbing the curve rails. It was a slow, dirty job, and a part of the oil was wasted on the ground. Then Mr. Oiler would get tired carrying the heavy pail, and he often climbed aboard the platform of the street car, perhaps getting a big spot of oil on a lady's silk dress in the operation. Nobody blamed the oiler because nobody wanted his job.

Now the mechanical oiler on two wheels is pushed easily along one rail, and at each curve it deposits the right amount of oil in the right place in one fifth of the time without soiling the workman's hands, or without endangering his life from automobile traffic by causing him to stoop over in the middle of the street. The inventors of this kind of machinery are to be congratulated. No one loves the messy job, and the progressive foreman or shop manager who devises mechanical means of getting around it is doing a good turn for labor as well as saving money for his firm.

Prevention Rather Than Cure

INSPECTION has two distinct uses. Its primary and most valuable function is to prevent unsuitable pieces being made. Some, however, seem to consider only the detecting of errors after they have been made. Such inspection may serve as a post-mortem, showing what the mistake is and why it was made. But the best of reasons for not earning a dividend are not nearly so satisfactory as the dividend itself.

One way to prevent errors that lead to the rejection of parts with the corresponding loss, is a more careful inspection of the tools and equipment used in production. This should be more complete and more thorough than the inspection of the part itself. Inspection of this kind should be made regularly and frequently.

An equally important item is the careful inspection and checking of the gages or measuring instruments themselves. In too many cases this does not receive the attention it deserves. We know of cases where shops boasted of, and worked to, standard gages that had worn far beyond the working tolerance. It is particularly important that all micrometers, whether owned by the men or by the shop, should be inspected frequently. For honest mistakes, due to errors in instruments, are just as costly as though caused by carelessness.

Inspection departments should be organized on the "prevention" plan.

Shop Equipment News

Foster No. 5 Universal Turret Lathe

THE Foster Machine Co., Elkhart, Ind., announces a No. 5 universal turret lathe built in two types, an eight-speed all-geared head and a six-speed cone head, each having a round bar capacity of 1⅛-in. through the automatic chuck, and a swing of 17½ in. over the ways and 9½ in. over the cross-slide. The bed in each instance is cast integral with the head and is provided with ways of V-type for supporting the carriage, which is gibbed to the underside of the ways.

The geared-head type shown in Fig. 1 provides eight spindle speeds through an all-steel, heat-treated gear train. Speed changes can be made without stopping the machine and are effected through multiple-disk clutches and one sliding gear. All operating levers controlling the speeds are conveniently located on the head of the machine. A separate clutch on the front shaft of the machine is provided for reversing the spindle and the reverse action occurs on the spindle alone and does not reverse any other gears in the train.

The spindle is machined from an alloy-steel forging, heat-treated, and is carried in special bronze bearings. The geared-head machine can be driven from a countershaft or directly from a motor mounted on the head, driving through a silent chain, or a motor mounted on the rear leg of the machine, driving through a belt. A motor rated at 3-hp. at 1,800 r.p.m. is recommended.

The cone-head machine is provided with a three-step cone pulley and back gears and is for use with a 4-in. belt. The clutches are of the cone type operated through a yoke and lever. The spindle in this case is also made from alloy steel, heat-treated, and is carried in special bronze bearings. The hole through the spindle is 2⅛ in. in diameter, and by placing the automatic chuck-operating mechanism on the rear of the machine, the shortest possible overhang of the spindle nose is obtained so that a rigid support is provided for the collet or chuck, it is said. By means of a double friction countershaft regularly supplied, six spindle speeds and reverse are obtainable.

The universal carriage is provided with six longitudinal feeds which are reversible. These are obtainable through an all-geared steel train operating in oil. Six feed changes are also obtainable on the cross-slide. Both carriage and cross-slide are provided with adjustable stops for automatically knocking out the feeding movements. The clutches controlling the feeding movements are fully adjustable outside the apron. The cross-slide is provided with a square turret and is detachable. It is machined from a steel forging and is provided with a ratchet mechanism to effect the indexing movement through the binder lever. Rocker blocks are provided for tool adjustment. The lock bolt for retaining the indexed positions is located directly beneath the tool in action.

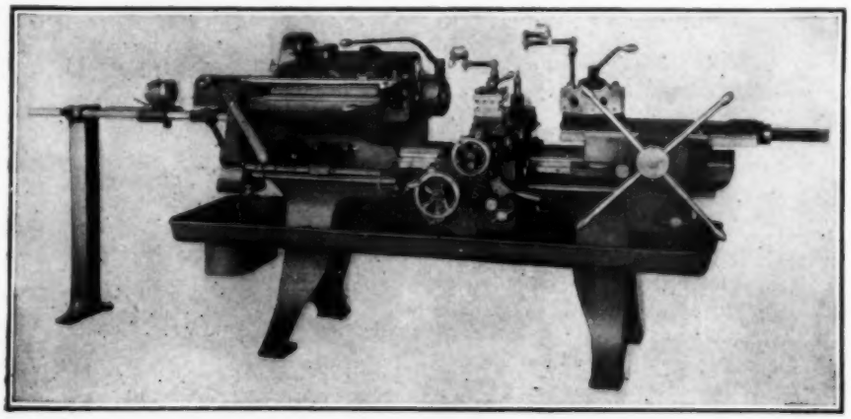


Fig. 1—Foster No. 5 Universal Turret Lathe, Geared-Head Model

The hexagon turret is held centrally on a hardened steel stud pressed into the slide. The taper bearing is formed between the stud and a sleeve pressed into the turret, and provision is made for close adjustment of this bearing. The turret is designed for use with either shank or flanged tools. It indexes automatically through the backward movement of the slide and a positive stop absorbs all shock from the indexing mechanism at the final movement of the turret. A taper gib on each side of the slide is supplied for the cross adjustment. Through six independent stop screws the power feeds may be knocked out at any predetermined point. The effective turning movement is 10¾ in. and the maximum distance of the face to the spindle nose is 20 in. Six power feeds are available to the turret slide.

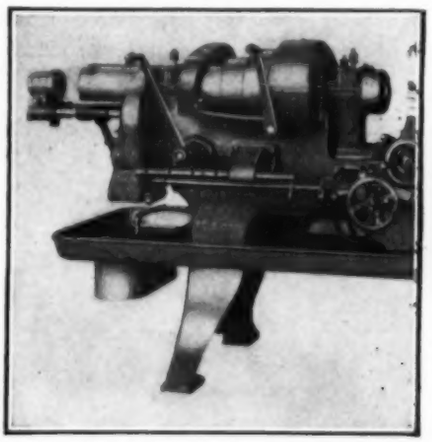


Fig. 2—Cone-Head Drive

The automatic chuck is of the master collet type with bushings for each size and shape of bar. Either the draw-in or push-out type of automatic chuck can be supplied and in either case, the extreme closing movement of the collet is through a toggle acting mechanism. The bar feed consists of a sliding stock head carried on two heavy parallel bars and operated through the same lever controlling the automatic chuck.

The net weight of the cone-head machine is 3,000 lb. and that of the geared-head type is 3,155 pounds.

The usual pan for catching the coolant is provided. From the sump a pump distributes the coolant through piping to the tool points.

Shop Equipment News

Chambersburg Large-Size Steam Drop Hammer

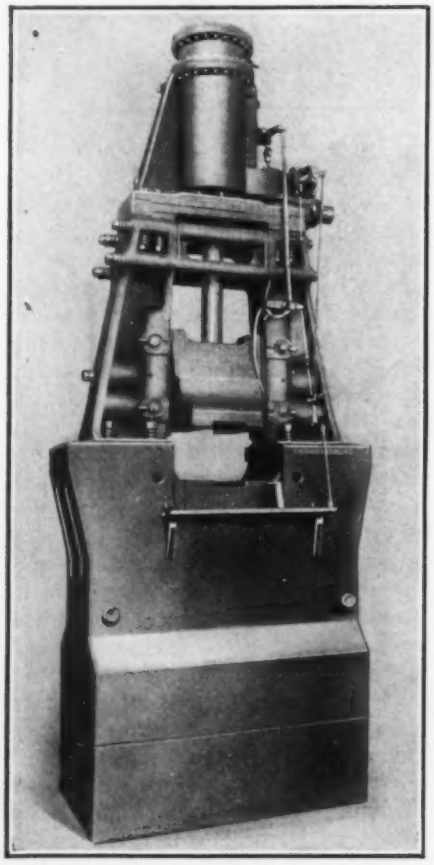
WHAT is said to be the world's largest and most powerful steam drop hammer, was recently built by the Chambersburg Engineering Co., Chambersburg, Pa., for use in drop forging valve bodies for high pressure steam service. The total finished weight of the hammer approximates 536,000 lb., and the total height from the bottom of the foundation to the top of the hammer is 48 ft. 6 in., while the overall height of the hammer itself is 32 ft. 6 in. With 100 lb. per sq.in. mean effective pressure on the piston, the energy in the ram at the instant of impact on full stroke is estimated at 428,000 ft.-lb. The weight of the ram without top die is 22,000 lb. and with an estimated weight of top die of 7,000 lb., the total falling weight is about 29,000 pounds.

The heaviest part of the hammer is the anvil which weighs 440,000 lb. and is made in three pieces. The main members of the hammer consist of the open-hearth steel frames and the anvil top. The bottom anvil sections are semi-steel and the cylinder is semi-steel with a cast-iron bushing. The ram and anvil cap are selected open-hearth steel forgings, specially heat-treated. The piston rod, all bolts and other important connections are specially-treated alloy steel.

The cylinder has a bore of 30 in. and a stroke of 52 in. The distance between guides is 46 in. The ram front to back measures 48 in., while the piston rod is 11 in. in diameter.

The frames are of I-beam construction, tied into the anvil with positive stops and compound wearing wedges. The tops of the frames are tied together with an interlocking tieplate and double tie bars. The guides are of steel with four V's and are of a universal adjustable type. These guides may be moved back into the frames so that the ram can be removed without disturbing the frames or cylinder assembly, or without removing the rod from the ram. The cylinder is locked into the tieplate on its base and is fitted with a balanced piston-type operating valve. It is also equipped with patented safety cylinder cover. The piston rings may be replaced or inspected without removing the rod from the ram.

The cam mechanism is of one piece construction and the cam bears on a solid cam face machined on the ram.

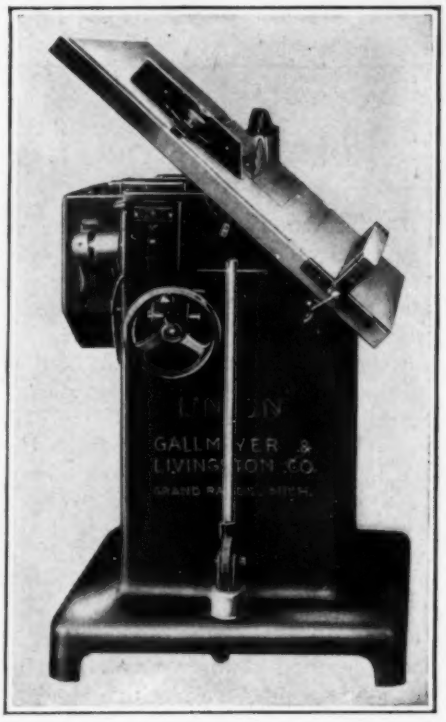


Chambersburg Large-Size Steam Drop Hammer

"Union" Motor-on-Arbor Saw Bench

As its name implies the "Union" saw bench, made by Gallmeyer & Livingston Co., Grand Rapids, Mich., has its driving motor mounted directly on the saw arbor, which is carried on ball bearings. The motor is designed to operate from any lamp socket and will cut stock up to 2½ in. in thickness. It is also possible to equip the machine with a special 1-hp. motor to operate from a power line and with larger saws so as to provide for 3½ in. depth of cut. The machine is said to be particularly suited for use in pattern shops.

The machine is equipped with a 30 x 34-in. table fitted with a removable throat plate to allow for the use of a dado head, grooving saws, and the like. The table tilts up to 45 deg. as shown in the illustration, and may be locked at any desired setting. A dial with graduations and a pointer indicates the exact position of the table at all times. A stop is provided to facilitate a quick and accurate return to the horizontal position.



"Union" Motor-on-Arbor Saw Bench

The cross-cut gage can be used on either side of the saw, two slots in the table being provided for this purpose. The gage can be quickly set at any angle and clamped rigidly in position for cutting off. Holes are provided for mounting an auxiliary wood face piece when desired. The ripping gage is machined on both sides and can also be used on either side of the saw. By tightening the lever head screw the ripping gage is locked in position and automatically lined up with the saw.

A saw guard protects the operator at all times. It sets down over the saw and can be instantly adjusted to allow any thickness of stock to be cut. It is said to afford adequate protection even when the thickest material is being cut. A splitter guard is also part of the equipment and this keeps the stock from pinching the saw.

The pedestal is a heavy one-piece

Shop Equipment News

casting fitted with two rollers at the back and two stationary feet at the front to give a firm foundation when in operation. With the handle pulled forward into position for moving the machine a cam automatically raises the feet from the floor and brings the weight of the machine on a third roller which is carried on a swivel bearing moving with the handle.

A suitable switch is mounted in a convenient position and the machine is furnished with 10 ft. of drop cord and an attachment plug.

Defiance No. 723 Double-Spindle Shaping Machine

THE Defiance No. 723 vertical double-spindle shaping machine shown in the accompanying illustration was designed especially for tapering and re-shaping adz, hammer and hatchet handles or similar articles after they have been turned and dried. The machine is belt driven. It is made by the Defiance Machine Works, Defiance, Ohio.

The frame is a heavy casting in one piece with a cored base and is said to be of sufficient strength to overcome all tendency to distort. The top is a separate planed casting measuring 20 x 21½ in. with a steel form or slide to guide the travel of the saddle and contour strips to govern the shaping between the cutter heads.

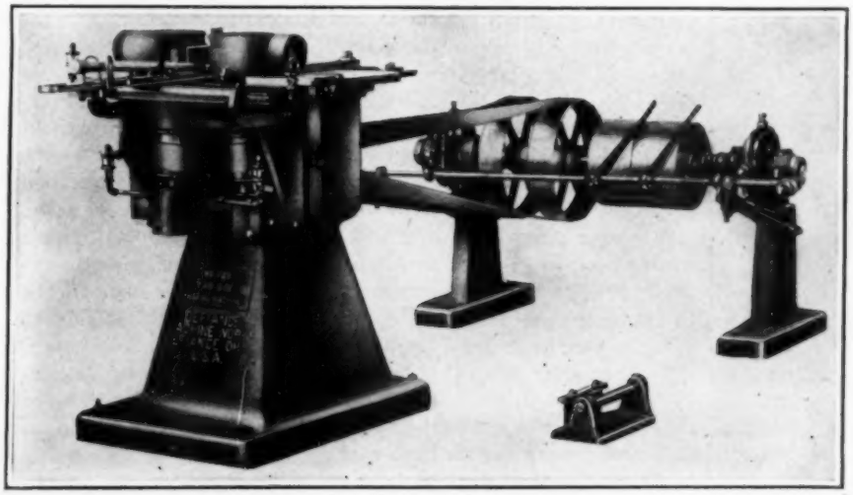
The carriage supports the main form which has adjustable tracks on each side giving a capacity to shape material 12 in. long or shorter. The maximum taper provided is ½ in. on each side. The stock can be shaped straight or parallel or with irregular shaped edges depending upon the contour of the tracks used. The machine will regularly accommodate stock up to 3 in. thick and from 1 to 3½ in. wide, on the table.

The spindles are made of high-carbon steel $1\frac{7}{16}$ in. in diam. and ground to size. The spindle ends to which the cutter heads fit extend 3½ in. above the top of the table and will accommodate cutter heads carrying knives 3 in. wide or less. The spindle centers are 8¾ inches.

Square steel cutterheads are used carrying four knives with chip breakers and having a cutting circle of 5⅛ in. The machine is regularly equipped with one pair of steel cutter heads and a knife setting device, with one form and contour strip and the necessary oil cups and wrenches.

There is also supplied as regular equipment two 20-in. floor stands with Hyatt roller bearings having two driving pulleys 14 in. in diam. by 3 in. face and tight and loose pulleys 10 in. in diam. by 5 in. face. The normal speed of operation of the countershaft is 1,200 r.p.m. Belt shifting apparatus is included.

The machine occupies a floor space 54 x 78 in. Its net weight is 1,100 lb., while the domestic shipping weight is 1,260 pounds.

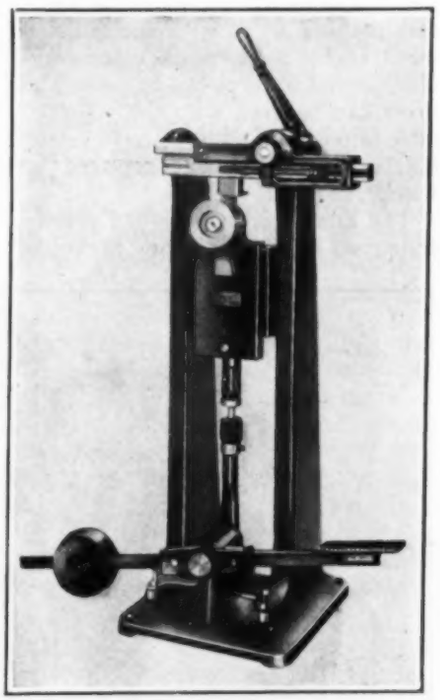


Defiance No. 723 Double-Spindle Shaping Machine

Noble & Westbrook Special Marking Machine

THE Noble & Westbrook Manufacturing Co., Hartford, Conn., has redesigned its standard No. 3 hand-operated marking machine for use in marking on the outside of metal flanges or near the outside edges of cups, rings, cooking utensils and the like of large size. To this end a special slide and special roll fixture has been substituted for the table. With this design almost any size of article up to 2 ft. in diameter can be marked on the outside in a position near the edge.

A flat marking die or steel type set in a holder is used to make the mark. The die is passed over the



Noble & Westbrook Special Marking Machine

work through a forward motion secured by a rack and pinion operated by a hand lever. This combination is said to give strength and speed and articles can be marked as fast as the operator can handle the work.

For making dishes, rings, and large round objects the machine has the advantage of having no projecting table to limit the size of the piece being marked. The work holder is a part of the machine and the same style of frame is used as in the standard No. 3 machine.

Shop Equipment News

Minster Adjustable-Bed Horning and Wiring Presses

AN IMPROVED series of adjustable-bed horning and wiring presses has been brought out by the Minster Machine Co., Minster, Ohio. Presses of this type were originally designed for the manufacture of tin pails, cans and similar articles, and were principally used for seaming operations by inserting the part over a projecting horn. They were also found adaptable for wiring and curling the edges of pails and cans. In addition, it is claimed that this type of press is readily adaptable to a wide range of operations, including cutting, drawing, forming, perforating, and shaping work with combination dies. Due to the large die space available, special fixtures can be used. The press can be used with the standard table in position, with the table swung out, or with the table replaced by special fixtures.

The line of adjustable-bed presses comprises six sizes, ranging in weight from 1,200 to 9,200 lb., and ram pressures from 12 to 56 tons. The Nos. 1, 2 and 3 machines are furnished in a flywheel-type drive only, while the Nos. 4, 5 and 6 can be furnished with either flywheel or back-geared drive. If individual motor drive is required, either the belted or direct geared drive can be furnished on either the flywheel or back-geared type of machine.

The frame casting is said to be correctly proportioned so that the points subject to the greatest stress are reinforced. Ribs are cast on the inside of the frame to provide added rigidity, and the web forming the finished section on the back part of the frame is continued to the top, so that the body is not opened in the back of the slide. All the frame castings are made of high-grade semi-steel. The bearings are of large diameter and long length, and are overhung so that the upward thrust of the crankshaft is centered in the solid casting and is not borne by the caps. This construction is said to give all the advantages of a solid bearing. The main bearings are bored in a special fixture to assure perfect alignment of the crankshaft. For blanking, forming or similar operations, a table is provided, although it is not standard equipment. It has a large opening which can be utilized for "push through" work, but is regularly furnished with a standard bolster plate. As can be seen in Fig. 2, this table is hinged to the frame so that it is possible to swing it aside readily whenever it is not in use. Alignment is maintained by a vertical slot in the face of the press, and the table itself is securely held in position by four studs which extend through the slots in the rib section of the frame. The table is adjustable for height by means of a screw and handwheel.

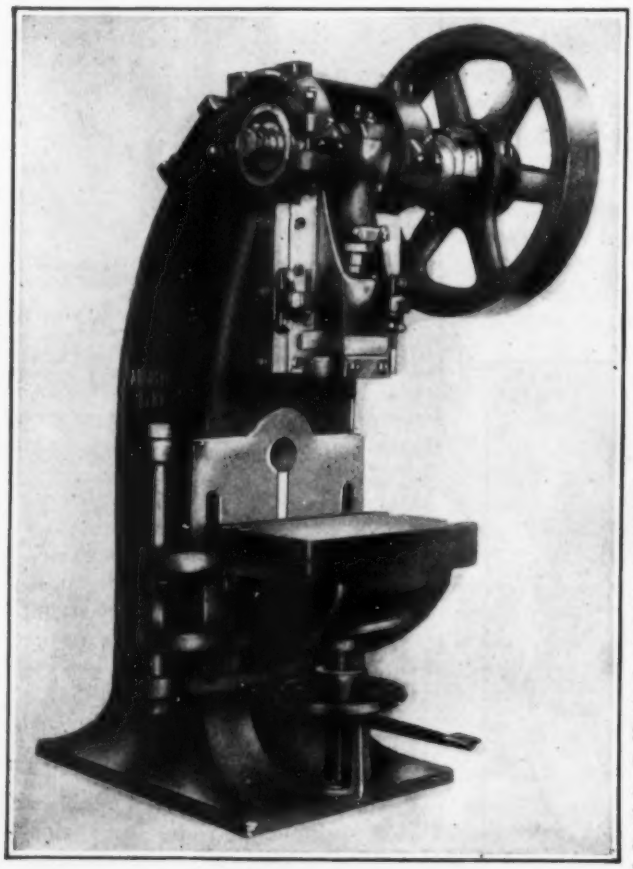


Fig. 1—Minster Adjustable-Bed Press

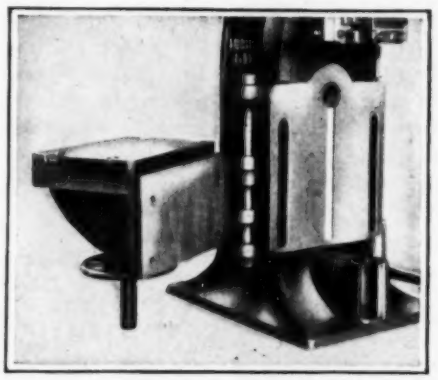


Fig. 2—Press with table swung aside

The clutch is of the sliding dog type of an improved form. The clutch dog or pin, as well as the clutch switch, are made of alloy tool steel especially hardened. The points of engagement on the clutch switch and clutch pin are tapered, so that the action of the clutch is positive under all conditions. A simple and easily adjustable brake is also used to control the crankshaft. It is lined with a non-burning brake lining. The clutch switch is also arranged to act as a positive stop in case of failure of the brake, so that the press cannot repeat unless the treadle is held down. A safety pin has been provided in the clutch, so that dies may be set while the flywheel is in motion. The largest size machine is equipped with a three-engagement-point, block-type clutch. All the machines are equipped with positive crossbar knockout in the slide, and knockout brackets are attached to the frame inside of the gibs.

The slide is extra long and moves in long and heavy V-shaped gibs carefully scraped to a fit. Adjustment for wear is taken up at one side. The bearing part of the slide is furnished with deep oil grooves. The punches are held in the slide by an adjustable cap, which is clamped with studs extending through from the back of the slide. Lugs are cast on the side to facilitate the fastening of wider punches, or to hold stripper attachments. The pitman connection is of the ball screw type and is made of high-carbon steel. The screw is said to be rigidly clamped in the pitman and is of large diameter.

The flywheel is said to be correctly

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proportioned for the rated ram pressure of the machine. It has a long bronze bushed bearing, with provision for oiling while running. On the flywheel type of drive the wheel is provided with two striking and backing pins. On the geared type, three contact points are provided. Drift pin holes are drilled into the hub of the flywheel so that the striking or backing pins can easily be removed if wear makes replacement necessary.

The crankshaft is a high-carbon steel forging, with enlargement for the clutch body. All main bearings are ground so as to give a smooth running fit, and the cross-sectional area of the pin bearing is approximately 45 per cent greater than the main bearing.

SPECIFICATIONS

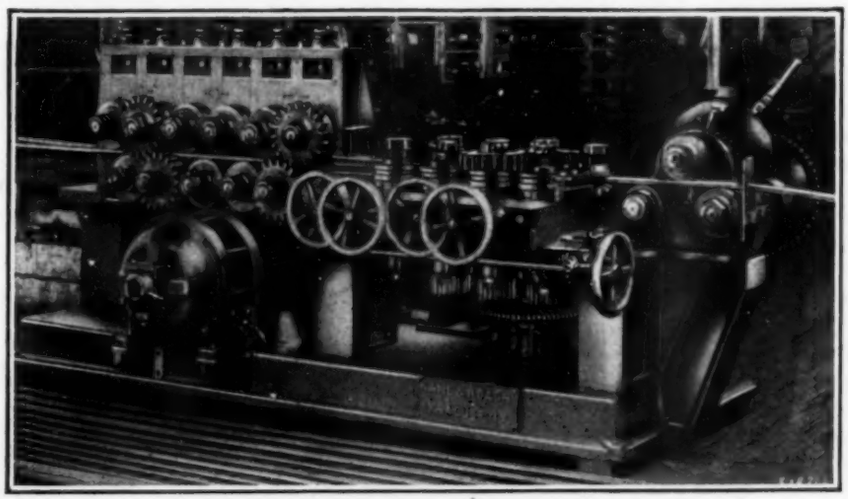
No. of Machine	10-1	10-2	10-3	10-4	10-5	10-6
Ram pressure, tons	12	16	22	32	45	56
Standard stroke of slide, in	1½	2	2	2½	3	3
Maximum stroke of slide, in	3	3½	3½	4	5	6
Adjustment of slide, in	2	2	2½	3	3	3
Area top of bolster, in	9x16	10x17	12x20	14x22	18x22	22x32
Thickness of plain bolster, in	1½	1½	1¾	2	2½	2½
Available length of horn, in	9	11	15	19	21	23
Maximum die diameter of slide plate, in	7	8	12	15	18	20
Will wire up to, diameter and depth, in.	8x12	10x12	12x14½	16x16	18x17	19x17
Flywheel Press Only						
Weight without table, lb	1,200	1,550	2,600	4,300	5,600	8,500
Number of strokes per minute	125	115	115	100	90	90
Floor space overall, in	33x30	38x32½	42x37	50x41	59x46	65x52
Size of motor, hp	1	1½	2	2	3	5
All Geared Only						
Weight without table	.....	.....	.....	4,900	6,200	9,200
Number of strokes per minute	.....	.....	.....	55	50	45
Floor space overall, in	.....	.....	.....	50x48	59x55	65x60
Size of motor, hp	.....	.....	.....	2		5

Kane & Roach No. 2A Combination Roll Straightener

KANE & Roach, Inc., Syracuse, N. Y., have designed the No. 2A machine shown for straightening rod materials in two planes in one pass. In the illustration the material being straightened is hexagon bolt stock but the machine is by no means limited to this one class of work. Through the use of proper rolls it will handle any of the various shapes and sizes that can be straightened on this company's standard straightening rolls. The machine has a capacity of ⅜ to 1¼ in. hexagon stock, or proportionate shapes, and in the installation shown one set of rolls will handle a range of hexagon stock from $\frac{7}{16}$ to 1⅛ in., graduated in sixteenths.

The pyramid unit shown to the right of the machine is optional. It is used to remove the major bow of the material so that the effect of the horizontal and vertical plane units will be more uniform. After leaving the pyramid unit, the material passes through the vertical roll shaft unit and from there it is guided into the horizontal roll shaft unit. Both units are provided with independent adjustment of the upper rolls. In addition the vertical roll shaft unit is adjustable in and out as a whole, so that the center line can be maintained for materials of varous diameters. Scales and pointers are provided so that a record of the various settings can be kept.

The machine is of rugged construction and is mounted on a single bed plate. One motor, rated at 15 hp. at 1,140 r.p.m., drives all three units. The delivery speed is 125 ft. per min. The pyramid straightening unit located at the feed end and the vertical roll shaft unit, are driven by roller chains, while the horizontal roll shaft unit is gear driven direct from the motor. This machine can be built as described or can be modified to meet specifications. The horizontal straightening set is usually supplied with twelve rolls but it can also be furnished in an eight-roll unit, when desired. The machine is built in several sizes.



Kane & Roach No. 2A Combination Roll Straightener

Shuster Automatic Wire Straightening and Cutting Machine

The F. B. Shuster Co., New Haven, Conn., has brought out an improved model of its automatic wire straightening and cutting machine in which all of the mechanism is driven by one belt instead of three belts as formerly employed.

The single belt drives direct to the arbor, or straightener, which is made of steel in one piece and runs upon Timken roller bearings. Power to drive the feed rolls and cutting-off mechanism is derived from the arbor through an inclosed worm and worm-wheel reducing train that runs in oil.

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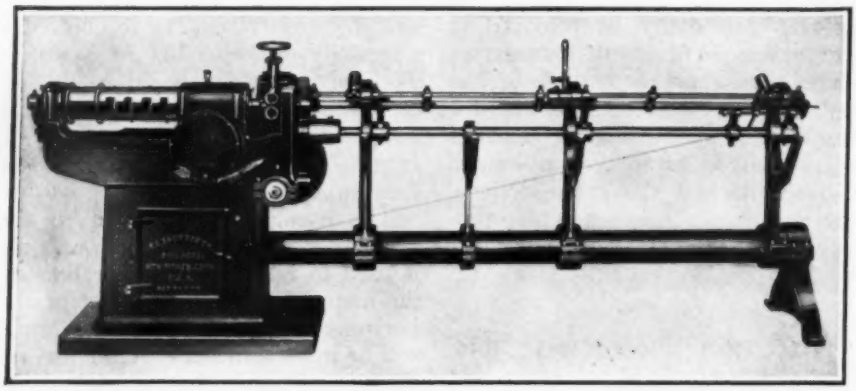


Shuster Automatic Wire Straightening and Cutting Machine

The worm is of hardened steel and the wormwheel of bronze.

The cradle into which the wire discharges from the straightener may be made of any length desired. The gage at the end of the cradle is attached to the trip lever of a quick-acting clutch which sets the cutter in motion instantly when the end of the wire reaches it. This gage is adjustable to cut any length within the range of the cradle.

At the moment the wire is cut the cover of the guide bar is opened and the cut length of wire is discharged into forked holders which are made as parts of the cradle. The cutting-off mechanism may be operated by a lever at the side of the machine at any time, independently of the automatic mechanism.

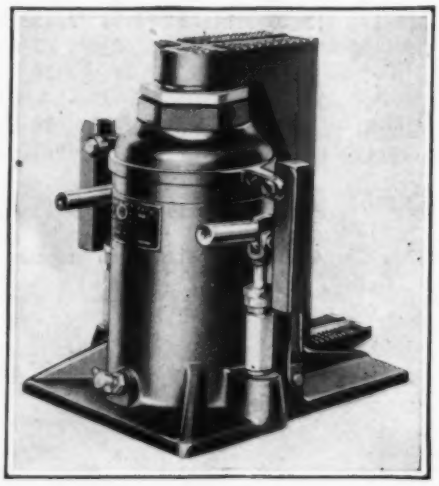
The machine may be driven from an overhead line shaft or motor, or when so ordered it may be provided with an extended base to which the motor may be directly attached, thus making it a self-contained machine.

The machine is built in three sizes.

Blackhawk Hydraulic Jacks

The Blackhawk Manufacturing Co., Milwaukee, Wis., announces a line of hydraulic jacks, using oil as a lifting medium, in sizes from 1½ to 75 tons. The line was originally made by the Hydraulic Tool Co. of Los Angeles, Calif., and has since been improved. The design is said to permit operation in cramped places and to give greater power and less effort in raising a load. The full stroke of the pump is unnecessary.

Pump unit and ball check valve are built on the outside of the jack where they are easily accessible. The release valve is entirely separate from the pump so as to prevent accidental lowering. It is positive in action. By turning the release valve the operator can automatically lower the load fast or slow as desired, thus giving positive control at all times. In fact control is said to be so positive that the jack can be raised within 0.001 in. of the desired point. In order to prevent the plunger from being raised beyond safe limits, a by-pass is provided. The heavy-duty jacks are equipped with two pumps—one a low-pressure speed pump to raise the plunger quickly to the point of contact, and the other a high-pressure pump to carry the load. Even the heaviest jack is said to be light enough in weight to be carried easily by two men. The jacks can be operated in a horizontal position when the pump is on the down side. In this position the jack can be used for bending or forcing.



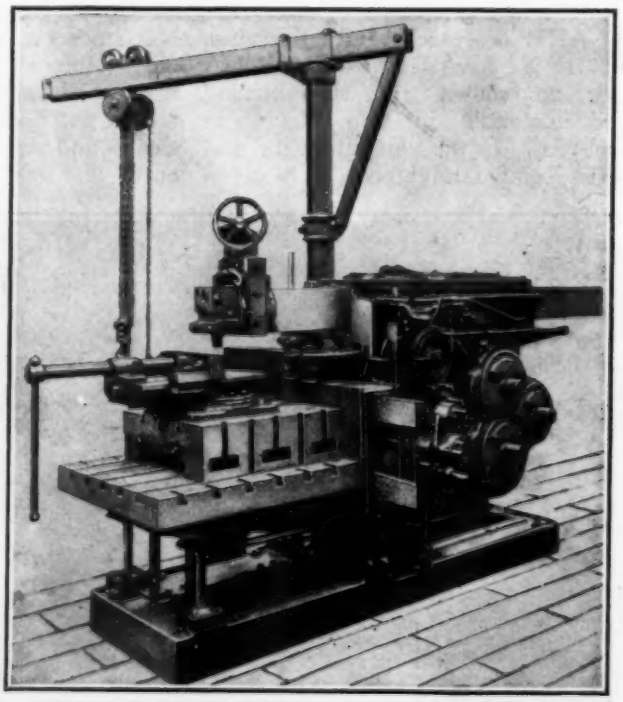
Blackhawk 30-ton Hydraulic Jack

The jack shown in the illustration is known as an H-14 floor lift type of 30-ton capacity on the head and 15 ton on the toe. The complete line of Blackhawk Hydraulic Jacks consists of ten models in nine capacities. The automotive models include single and double lift models, light and heavy duty, while the industrial models range from 18 to 60 tons capacity.

Morton 60-Inch Stroke Heavy-Duty Draw-Cut Shaper

THE general construction of this 60-in. stroke heavy-duty draw-cut shaper is similar to the other draw-cut shapers made by the Morton Manufacturing Co., Muskegon Heights, Mich., except for the size of ram, cross-rail and bed which have been increased to accommodate larger work and heavier production.

It is manufactured with 36, 48 and



Morton 60-Inch Stroke Heavy-DutyDraw-Cut Shaper

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60 in. of horizontal or side feed on the cross-rail and has 18 in. of vertical feed. The regular equipment includes crane and hoist, auxiliary top table, extra-heavy steel vise, large T-slotted work table, and a set of O.K. tools and holders. The machine can also be equipped with a special tilting vise for particular use in production work on frogs and switches.

Anderson Improved Power Scraper

THE power scraper shown is made by Anderson Bros. Manufacturing Co., Rockford, Ill., and is claimed to be simple in construction, light in weight, and rugged enough to stand up against hardened usage.

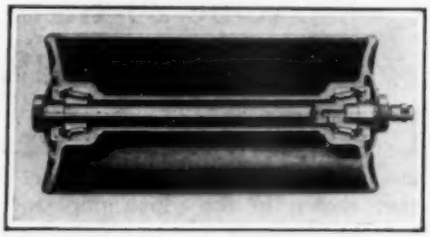
The complete unit includes a floor stand which has an elevating truck so that the unit can be raised upon wheels and moved about the shop. When the tool is in use the stand rests solidly upon its base. Drive is by means of a ¼ hp. motor which can be connected to any electric lamp socket. The motor is equipped with a Westinghouse Sentinel circuit breaker, which automatically shuts off the current when the motor is overloaded. The final drive of the scraper is through a rack and pinion.

The control for operating the scraper ram is said to be extremely sensitive in that only $\frac{1}{16}$ in. forward movement is necessary to cause a forward stroke at the rate of 60 ft. per min. A reverse action causes the scraping ram to return at the rate of 90 ft. per min. The manipulation of the control is said to be as natural as hand scraping, so that the operator subconsciously advances and reverses the tool. The length of the stroke has a range from a fraction of an inch up to within the entire length of the ram. The scraper has a working radius of 6 ft. Scraper blades are quickly and easily removed.

Anderson Improved Power Scraper

Link-Belt Anti-Friction Belt Conveyor Idler

The Link-Belt Co., 910 S. Michigan Ave., Chicago, Ill., announces an anti-friction belt conveyor idler. The roll incorporates Timken tapered roller bearings, totally incased. One of the outstanding features is the protection afforded by a labyrinth grease seal mounted in a grease cap, which also serves as an outboard reservoir and lubricates the bearing on the outside as well as on the inside. The rolls are mounted on a self-cleaning T-base. All rolls are interchangeable, being capable of serving in any of three positions. The frame is riveted. The idler rolls are supported in malleable iron brackets having large bearing surfaces. The brackets are so constructed as to support the ends of two adjacent rolls. Idler rolls are made in various standard lengths to suit standard belt widths.



Link-Belt Anti-Friction Belt Conveyor Idler

Brown & Sharpe No. 11 Micrometer

The No. 11 micrometer made by the Brown & Sharpe Manufacturing Co., Providence, R. I., was particularly designed to measure odd-shaped pieces having projections and recesses. One of the features of the tool is adjustment for wear on its measuring surfaces. The adjustment is said to be quick and positive and when made is locked. There is nothing to slip or loosen.

Brown & Sharpe No. 11 Micrometer

The opening in the frame is enlarged by an improved shape of the frame at its anvil and spindle ends, thus making possible many measurements not obtainable with the usual type of micrometer. The small size of the frame at its anvil end is also said to adopt it for measurements in narrow slots. The increased inside width of the frame accommodates odd-shaped pieces having projections and recesses. The accuracy in workmanship is said to be in accordance with Brown & Sharpe standards.

General Electric Small Limit Switch

The small limit switch shown has been designed by the General Electric Co., Schenectady, N. Y., to meet the requirements of the machine tool industry and other manufacturers for use in control circuits. The switch can be used for stopping carriages at the end of the travel and for similar applications.

The switch is made of cast iron and is arranged for conduit connection. It is dust tight. The contacts may be either normally open or normally closed, although the switch as shipped by the manufacturer is normally closed. The operating arm can be set at any angle by loosening the nuts on the operating shaft. If it is desired to use the operating arm on the other side of the switch, a form can be

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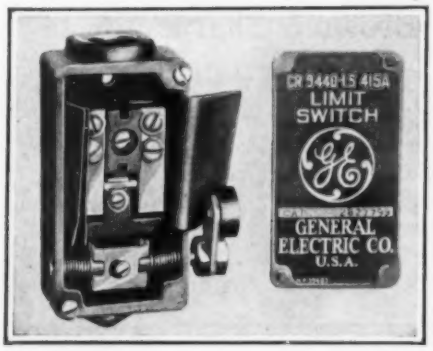


General Electric Small Limit Switch

furnished with this type of construction.

A varnished cambric lining completely incloses the contacts and terminal screws, thus eliminating any possibility of grounding or short-circuiting from stranded wires. When the switch is opened approximately ¼ in. it has a capacity of 2 amp. at 125 volts, 1 amp. at 250 volts, and 0.4 amp. at 600 volts. When mounting the switch it is desirable to arrange for operation with maximum throw in the shortest possible time to eliminate burning and thus prolong the life of the tips.

"Elastic Stop" Locknut

The American Gas Accumulator Co., 100 East 42d St., New York, has placed on the market the "Elastic Stop" locknut shown in the accompanying illustrations. As can be seen from the cross-sectional view,

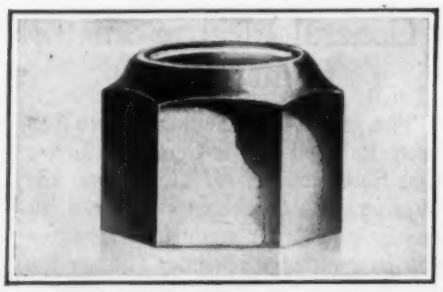


Fig. 1—"Elastic Stop" Locknut

Fig. 2, the nut contains an elastic cushion or disk of hard vulcanized fiber securely held within the nut by a spun-down flange. The hole through the disk is somewhat smaller than the outside diameter of the bolt and is not threaded.

When the bolt enters the nut and meets resistance from the cushion it is pressed backward as shown so that the contact between the metallic nut and the screw takes place on those flanks of the thread that sustain the pressure after the nut is drawn home against a support. This backward pressure forms a friction resistance on the metallic flanks said to be sufficient to keep the nut from turning so that the nut will always fit tightly on the bolt even though it is not drawn home. When the bolt enters the cushion further it impresses a thread which fits with a suction fit around the bolt. No chip is cut out. The cushion expands upon the entrance of the bolt and comes back to the original position when the bolt is removed. Hence in addition to the metallic friction of the thread the fiber disk exerts a considerable braking pressure around the bolt and prevents the nuts from turning and becoming loose due to vibration.

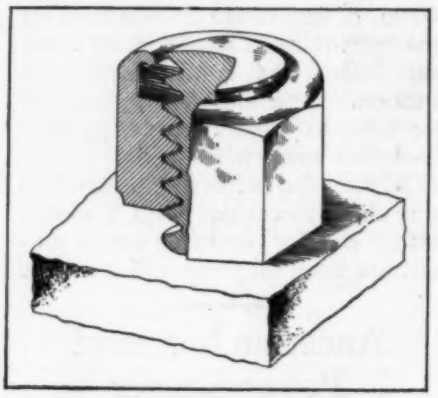


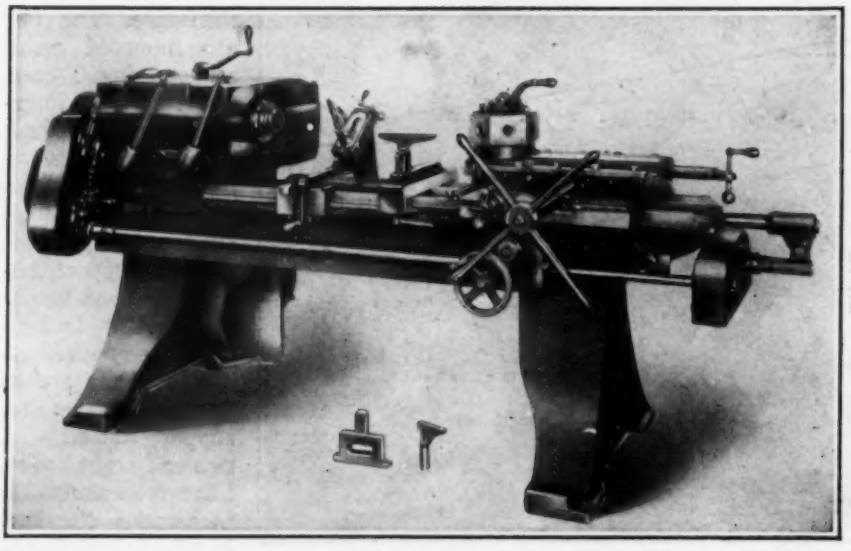
Fig. 2—Cross-sectional view of the nut

Acme 20-Inch Full-Universal Brass Turret Lathe

THE Acme Machine Tool Co., Cincinnati, Ohio, has designed the 20-in. full-universal brass turret lathe, shown in the illustration, to meet the demands for machining a variety of parts made of brass or similar metals. The machine is flexible and will accommodate a wide range of work. It is said to be rigidly constructed throughout and has considerably more weight than the conventional type, so that vibration is reduced to a minimum when unbalanced castings are rotated at high speed.

The head is cast solid with the bed to insure rigidity and alignment. It is regularly furnished with a 3-step cone pulley and friction back gears, providing two speeds for each cone step. A single-pulley drive with a quick-change, all-geared head, providing twelve speeds forward or reverse, can also be supplied.

The turret is hexagonal in form and is provided with a quick-acting lever that operates the lock bolt and binds the turret. The slide on which the turret is mounted may be quickly fed to and from the work by hand by means of a turnstile, or slowly by means of a hand-operated ball crank



Acme 20-Inch Full-Universal Brass Turret Lathe

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lever at the end of the slide. A cross movement is also provided in the turret. The large bearing area and long dovetailed guide of the cross-slide, is said to make the joint as rigid as a one piece construction.

To insure permanent alignment, the flat ways upon which the cross-slide saddle was formerly mounted have been replaced with V-type ways. The entire carriage may be traversed along the Vs the entire length of the bed by hand or power feed. This construction is said to have many advantages: it makes possible the use of long piloted boring bars; it permits the most rigid setups to be made; the turret overhang can be reduced to a minimum; and quick set-ups can be made.

Another prominent feature is the taper attachment for the turret. The adjustable taper guide shown below the bed slides between the Vs and can be clamped in any position or removed when not in use. The design permits tapers to be turned by either hand or power feed.

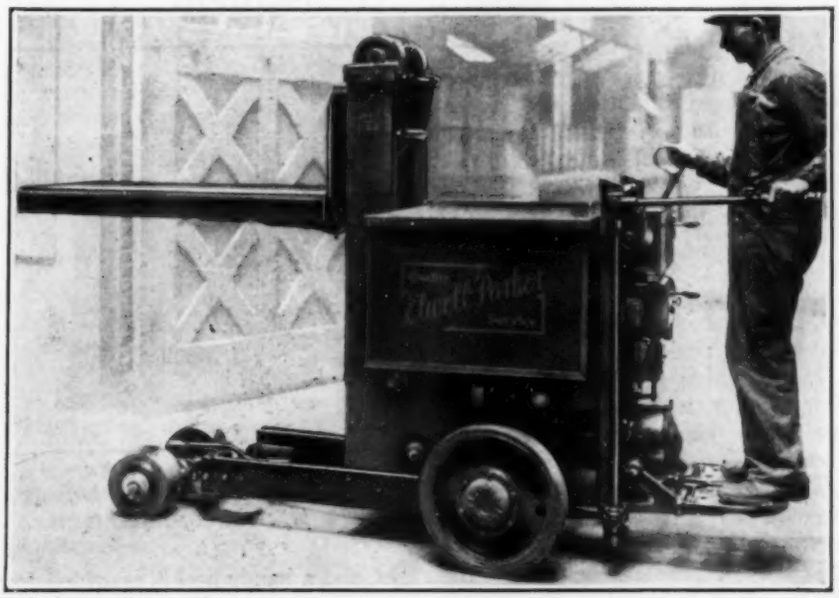
A bed-type chasing attachment is regularly furnished for chasing straight and taper right- or left-hand threads. One leader and follower is required for each size of thread. An apron-type chasing attachment can also be furnished for the turret carriage for leader taps and dies and for chasing internal or external threads. The attachment can be used in conjunction with the taper attachment for chasing taper threads. The same leaders and followers are used as furnished with the bed-type attachment. To insure accuracy and long life of leaders and followers the spindle revolves two revolutions to one of the leader driving shaft. This design is said to permit the use of coarser-pitch leaders and followers with greater bearing area. All aprons are so machined that the chasing attachment may be applied at any time, if later desired.

A hand-rest saddle with hand rests of different lengths is also included. Motor drive can be supplied at additional cost.

Elwell-Parker 2-Ton Tier Tructor

THIS 2-ton, light-duty electric tiering tructor has been added to the Mill-Type Series of the Elwell-Parker Electric Co., Cleveland, Ohio. The machine is designed to handle skid loads or to elevate the load from the floor 4 to 8 ft. when tiering or delivering goods to truck or car platform.

The machine is of all-steel construction and is built on the interchangeable parts basis. The power plant is of the unit type. It comprises an inclosed Elwell-Parker motor, steel brake drum, steel multi-thread worm and bronze differential wheel, chrome-vanadium drive shafts, and universal joints connecting the power plant to the steel clutch plates bolted to the outside of the drive wheels. The trail wheels are fitted with solid rubber tires 10 in. in diam. by 6 in. face and are mounted upon Timken tapered roller bearings.



Elwell-Parker 2-Ton Tier Tructor

The operator's pedals, one for brake and the other for the controller, are spring tripped to the off-position when the operator leaves the truck. The braking and power applications are separate to provide for incline operation. In addition, a heavy-duty drum-type controller is also used on the machine to control the travel of the truck. The lift controller, located beneath the driving-motor controller, is also of the drum type. An automatic trip device returns the drum to off-position when the load platform reaches its highest or lowest point.

The platform is a solid plate of steel with edges bent into a deep skirt and with heavy angles welded down the middle for attachment to steel support arms. Each arm carries two rollers that bear on heavy channel uprights fitted with track. The lift is effected through steel cables by means of a standard Elwell-Parker inclosed-type motor with spur gear reduction to double-grooved drums. The cable tension is automatically maintained by a special device.

The main frame is built of angle channels and heavy gusset plates riveted into a rigid box frame with a battery compartment. This compartment will accommodate practically any size of battery the service may require. The tructor is said to be narrow and short enough to turn in narrow aisles through the special four-wheel steer. The steering mechanism is of the ball and socket type, and steering is effected by means of a hinged horizontal lever. The entire outfit is lubricated by Alemite fittings.

Demco 4-Point Drill Press Vise

To facilitate the handling of regular and irregular shapes, Demco Incorporated, 105 S. Calvert St., Baltimore, Md., designed the 4-point drill press shown in the illustration. The

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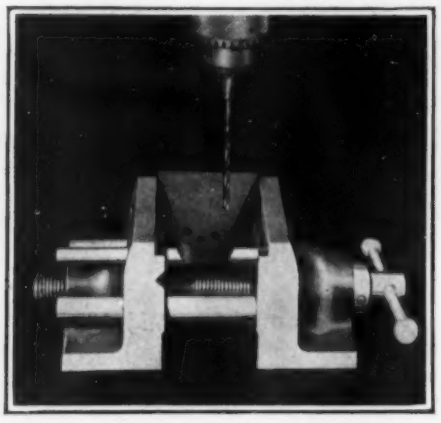
vise is milled on all four sides and the ledges in the jaws are parallel. The tops of the cross rods are in the same plane as the jaw ledges and are easily removed. The jaws are made of semi-steel and the guide rods and screws of steel.

The vise holds the work at all times with three points of support and in many cases four points, it is claimed, with a minimum amount of pressure so that the piece to be drilled or tapped is not distorted. The screw is 1½ in. below the ledges in the jaws and the guide rods 1¼ in. below, thus



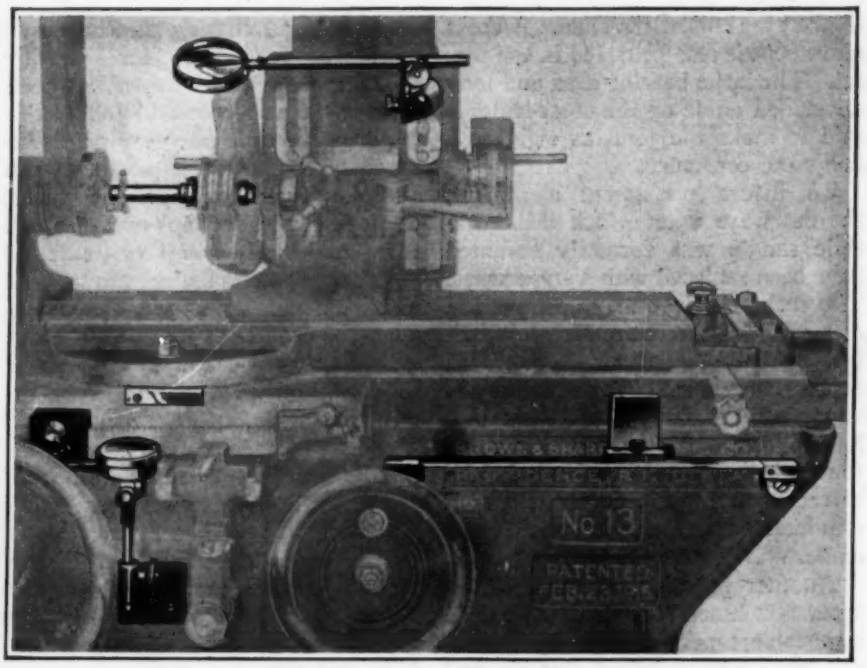
Demco 4-point Drill Press Vise

preventing injury from the drill point. There is no base to the vise and therefore no chance for chip clogging. The vise is made in two sizes: The No. 4 size has a jaw 4 in. wide and an opening of 4 in., while the No. 8 size has an 8-in. jaw and 8-in. opening.

Brown & Sharpe Circular Forming Tool Grinding Equipment

The contours of screw-machine forming tools and work of a similar nature can be ground with the equipment recently developed by the Brown & Sharpe Manufacturing Co., Providence, R. I., for use on their No. 13 universal and tool grinding machine. This equipment is known as the circular forming tool grinding equipment and can be readily applied to the machine. It is furnished either as a complete equipment or in separate units. It is said to be advantageous when extreme accuracy in the duplication of forms is desired, especially in high-speed steel.

Floating work arbors hold the work in position between centers and a



Brown & Sharpe Circular Forming Tool Grinding Equipment

radius truing device and magnifying glass provide for accurately truing the grinding wheel to the correct form. A dial indicator mounted in a bracket secured to the bed permits accurate reading of the table movements since the point on the indicator engages a stop on the sliding table dog rack.

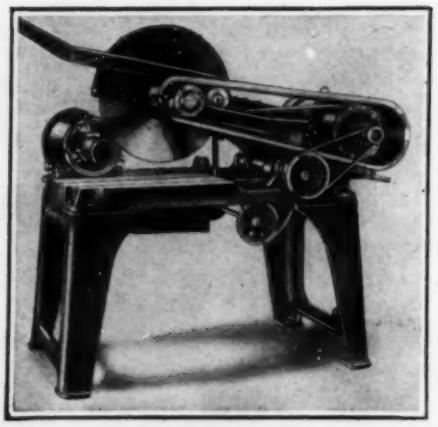
A scale to the right of the cross-feed handwheel is designed to give accurate vernier readings on long work beyond the capacity of the dial indicator. The vernier is attached to the sliding table. Fine angular adjustments of the upright are facilitated by another vernier located on the cross-feed carriage at the rear of the machine. When grinding angles the swivel table vernier provides for additional adjustments.

Hunter No. 1-B Metal Cutoff Saw with Pipe-Cutting Attachment

A rotating device for cutting pipe up to 8 in. in diam. has been applied to the No. 1-B high-speed metal cutoff saw made by the Hunter Saw & Machine Co., Pittsburgh, Pa. The device is driven from the pulley on the motor that drives the saw. Rotation of the device is controlled by a clutch on the left side of the machine that is thrown into action when the saw frame is pulled down into cutting position.

The machine is equipped with a 10-hp. motor, a starter, endless belt, two saw blades, and necessary wrenches.

The machine retains the features of the company's standard high-speed cutoff saws. The circular saw is driven by an endless belt from the motor, which is keyed to the base to insure proper alignment of the pul-



Hunter No. 1-B metal cutoff saw with pipe-cutting attachment

leys, and a handwheel is provided for belt adjustment. Both the belt and saw have steel safety guards.

NEWS OF THE WEEK

Removal of Trade Barriers Seen as the First Step in Securing World Economic Recovery

Delegates to International Chamber meeting pledge action at home

By Edward J. Mehren
Vice-President, the McGraw-Hill Publishing Company, Inc.

Stockholm, July 2, 1927.—As already reported in cables, the problem of removing the trade barriers which hamper international trade, particularly in Europe, was the dominant topic of the Fourth Congress of the International Chamber of Commerce. The enthusiasm with which the various delegations, from forty-one countries, supported the recommendations and thus approved the conclusions of the International Economic Conference at Geneva is virtually a pledge that they will go home with the intention of impressing on their ministries the need of legislative steps to remove the barriers; and to remove them because such removal will be to the best interest of their own respective countries. Thus the Chamber and its national committees become the driving force behind the Geneva recommendations.

The congress also discussed a dozen reports on various phases of international trade, the reports being the result of long work by committees of experts representing many countries.

Alberto Pirelli, of Milan, Italy, was elected president of the Chamber for the next two years, and Amsterdam selected for the next meeting in 1929.

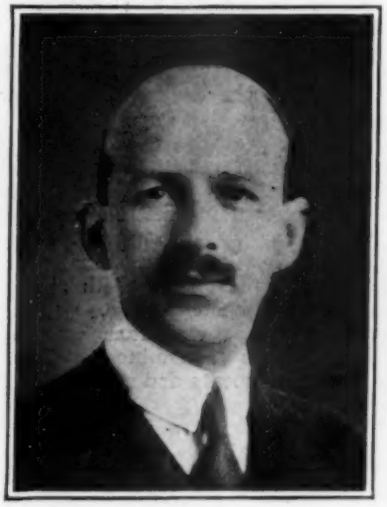
So much attention has been given the subject of trade barriers in *American Machinist* in reports from Geneva, and in cable messages from Stockholm, that repetition is not called for here. It should be noted, however, that the conclusions are not aimed particularly at the United States tariff wall, and that other barriers besides tariffs are considered. In fact, the chief difficulties for Europe are the European trade barriers, including 11,000 km. of tariff walls erected since the war.

To clear up the meaning of the term barrier, the committee at Owen D. Young's suggestion, happily prefaced its report with a definition and preamble, as follows:

"Trade barriers in the international sense are those arbitrary national restraints on the free movement of goods, capital and services, which not only restrain trade and traders but limit the economical production and distribution of goods, capital and services to the detriment of the peoples affected by the restraint. They depress the standards of living.

"In production of all kinds there is a unit of maximum economy. In distribution there is a market of maximum economy. Any barrier which prevents the co-ordination of the two is a trade barrier in the large sense in which this congress uses the term. Trade is not an end in itself. It is only a means to an end. The general economic welfare is its goal."

The conclusions on trade barriers, practically identical with those of Geneva favor (1) the cessation of tariff increases and the beginning of a movement in the opposite direction; (2) equal treatment of foreigners and foreign corporations engaged in trade or industry; (3) removal of obstacles to transportation; (4) elimination of prohibitions on exports and imports; (5) simplification of customs classifications; (6) unification of tariff nomenclature; (7) stabilization of customs tariffs; (8) simplification of customs formalities; (9) removal or decrease of those tariff barriers that gravely hamper trade, starting with those which were imposed to counteract the effects of disturbances arising out of the war; (10) long term commercial treaties; (11) removal of all barriers to free movement of capital.



Alberto Pirelli
of Milan, Italy, the newly elected president of the Chamber

Finally, the congress endorsed the conclusions on rationalization and international industrial pools (or ententes) reached at Geneva, and already published on page 1036a, Vol. 66, of *American Machinist.*

The Chamber then called upon its national committees to urge upon their governments the adoption and application of the Geneva and Stockholm conclusions, to make these representations before the end of September, 1927, and report the result of their action to the Chamber so that a summary of the progress achieved might then be published. In other words, an active campaign to secure the practical application of the Geneva conclusions was put under way.

The meetings on Trade Barriers was ably presided over by Norman H. Davis, one of the official American delegates to the International Economic Conference, and Dr. Karl Kotzenburg (Germany).

Sir Arthur Salter, head of the Economic Section of the League of Nations, under whose auspices the Geneva meeting was held, made a stirring address on the relative functions of the League and the Chamber in getting action on the Geneva resolutions. The League has an official entree to governments which the Chamber does not possess. The Chamber, on the other hand, has a freedom of action not open to officials, and this freedom gives the Chamber a driving power which can be used for bringing the League's work to success. Sir Arthur declared that the League secretariat welcomed pressure from the Chamber and hoped that the Chamber would always assume the initiative.

Based on these general declarations he appealed for action on the Geneva resolutions, and particularly for pressure by the Chamber's national committees on the governments at home.

Directors of the International Chamber of Commerce, on the platform at the opening session in the Concert Hall, Stockholm, Sweden. K. S. Wallenberg, presiding officer of the Congress, is standing at the rostrum

Following Sir Arthur, Sir Alan Anderson, retiring president, added his voice in a plea for prompt and vigorous action. He said that there are in Europe 5,000,000 out of work, and 20,000,000 more under-employed, who, stood side by side, would make a line 11,000 miles long, the distance from England to Australia. It was a queue of wretchedness, of sickly children, of suffering mothers. How soon would the delegates, the national committees, take action and get results at home? He begged them to keep their eyes on that 11,000-mile queue of wretchedness and press on quickly, aggressively, to bring it relief.

On the matter of uniform regulations on bills of exchange and checks, the Chamber endorsed the action of its committee in preparing a draft of rules for the unification of the Latin and Germanic systems. The aim is to have only two systems: that of the United States and Great Britain, and the other what may be called the "Continental." The draft does not affect the American and British—or Anglo-Saxon—system. The Chamber also endorsed the calling of an international conference on the subject, to function as a continuation of the similar Hague conferences of 1910 and 1912.

The committee on export commercial credits (commercial letters of credit) brought in a provisional draft for standardization of practice (on which eight countries, including the United States, have uniform regulations). The work received general approval and the committee was directed to continue its work until a final draft is developed.

Double taxation, as in previous congresses of the Chamber, came in for vigorous handling, the aim being to secure the abandonment of double taxation of nationals resident abroad. The League of Nations is also working on the problem. Certain amendments were suggested to the League's draft convention on the subject, notably to secure unconditional adherence to the basic principle that "impersonal taxes should be levied at the source by the country of origin and that personal taxes should be levied by the country of domicile," of the deceased owner.

A uniform method of presenting national balances of payment is being developed by the committee on international settlements as a needed step in studying the great question of transfers, not only in connection with reparations but with international debt payments and all other international settlements affecting world trade. The work of the committee, which will be of great importance in following the effects of these huge settlements upon exchange, was approved, and the committee continued under the title "Committee on International Settlements and Economic Information."

Patents and Trademarks

Important recommendations made by the committee on protection of industrial property (concerned chiefly with patents and trademarks), are (1) that the sanction for the non-working of a patent, in countries where such rules are in force, be no longer forfeiture of the patent, but merely the grant of a compulsory license; (2) that registry of grantees, owners and licensees of patents be established in all countries and that documents or instruments not registered shall not be valid against third parties; (3) that all countries adopt a system of protection for inventions shown at fairs and exhibitions; (4) that national committees should urge their respective governments to ratify the decisions of the Hague Conference on patents without restriction or reserve.

Various amendments of the rules for commercial arbitration and conciliation were approved.

Certain suggestions to guide jurists in the drawing up of rules for enforcement of foreign awards (exequatur) were approved and referred to legal international bodies.

A committee on fairs and exhibitions is to be created "to conciliate the interests at stake, avoiding at the same time any undue multiplicity of such undertakings liable to throw an ever increasing burden on those participating therein."

On transport there were a series of reports and resolutions relating to rail and air transport, and to telephony, largely under European conditions. For sea transport the general use of the rules laid down in the Brussels convention of 1922 and 1923 was strongly urged by the appropriate committee and endorsed by the Chamber.

In the work and session of the highway transport committee, members of the American delegation took an active part. The highway committee of the American section had offered an elaborate paper on highway transport, dealing with the principles of highway finance, administration and control in the United States and discussing the relation of highways to other forms of transport. At the highway session, Roy D. Chapin, chairman of the board of the Hudson Motor Car Co., presided

and John N. Willys, president of the Willys-Overland Co., read an excellent paper on the development of highway finance practice in the United States. Following the meeting, Mr. Chapin entertained the delegates at luncheon, after which a number of films showing highway transport in America were shown. At the closing session, the following resolutions, submitted by the highway committee, were adopted:

"Recognizing that motor traffic, which was once a luxury, has now become essential to the efficiency of a progressive country, the congress recommends:

(*a*) That special taxes levied on the motor vehicle itself, or on the motor fuel, should be based on highway use, devoted to highway purposes, collected and expended under centralized state control.

(*b*) That highways should be developed to suit modern traffic and that the cost should be distributed in relation to the benefits derived.

(*c*) That taxes should be such that they will not check the economic use of the motor vehicle.

(*d*) That where it is necessary to authorize constructors of a special road to charge toll for its use, the State should retain the right on payment of compensation to purchase or control the road.

(*e*) That city planning should provide for a free flow of traffic and proper facilities for garaging vehicles.

(*f*) That every precautionary measure should be taken for greater safety on streets and highways, including education of drivers, of pedestrians and particularly of children.

Eight-hundred and fifty-two delegates were present from forty-one countries, forming in all an exceptionally able group. The American delegation, with 162 accredited delegates, was second largest in number, and in quality compared well with other groups. Germany sent the largest delegation, about 180, the explanation of the large attendance being the proximity of Germany, her close business connections with Sweden, and the intensity of her interest in the work of the Chamber. The Germans came into the Chamber since the Brussels meeting of 1925, so that this was their first meeting.

Government Departments Helped

A feature of the meeting was the assistance proffered at private sessions of the American delegation by the various foreign services of the United States Government. The minister to Sweden, Mr. Harrison, explained the duties of the diplomatic representatives of the Government with reference to commerce—"To keep the highways of commerce open," as he summarized it. The American Consul at Stockholm explained the duties of his office, while the Department of Commerce, under the leadership of the Director of the Bureau of Foreign and Domestic Commerce himself, Dr. Julius Klein, had present the following commercial attaches: William L. Cooper, London; Fayette W. Allport, Berlin; Chester Lloyd Jones, Paris; H. C. MacLean, Rome; Mowatt Mitchell, Brussels; Harry Sorensen, Copenhagen; Ronald H. Allen (acting), Warsaw; Frederick Lyon, Helsingfors; T. O. Klath, Stockholm; Carl J. Mayer, Riga. These gentlemen, well informed on the countries where they are posted, were available during the congress for consultation by the American business men present.

As is customary at such international gatherings the entertainment was copius and lavish. The King, the Crown Prince, the Crown Princess and Prince William attended the opening session and the King subsequently received the delegates and their ladies in the castle. The Swedish National Committee of the Chamber gave, first, a reception and later a Gala banquet, while the City of Stockholm gave a reception in the Stadshuset (town hall), a building of monumental proportions and containing rooms of great size and striking dignity. There were besides many trips through the waterways about the beautiful "Northern Venice," as Stockholm is appropriately called.

Alberto Pirelli, the new president, is head of a large corporation, the Pirelli Co., of Milan, Italy, which makes a great variety of rubber goods, including automobile tires, and is a large manufacturer of rubber insulated electric cable. Their interests include rubber plantations in the Far East, and factories in Italy, Great Britain, Spain and the Argentine. His business interests have made him a student of international trade and finance.

Signor Pirelli was a member of the Italian delegations at the Cannes and Genoa conferences, a member of the Dawes Committee, and accompanied Signor Volpi, the Italian minister of finance, to America in connection with the settlement of Italy's war debt to the United States. In May he was a member of the Italian delegation to the International Economic Conference at Geneva. He sits on the Economic Council of the League of Nations, not as a government official but in his private capacity as a leading manufacturer. He is chairman of the Italian National Committee of the International Chamber of Commerce, member of the former Committee on Economic Restoration and chairman of the Committee on International Settlements.

Among the American delegates present were: Owen D. Young, chairman of the board, General Electric Co., and chairman of the American delegation; Albert F. Bemis, Bemis Bros. Bag Co., Boston; Willis H. Booth, vice-president, Guaranty Trust Co., New York; Wm. Butterworth, president, Deere & Co., Moline, Ill.; Wm. H. Chadbourne, New York, representing the American Zinc Institute; L. K. Comstock, L. K. Comstock & Co., New York; Col. Hugh L. Cooper, New York; Joseph H. Defrees, former president, Chamber of Commerce of U. S. A, Chicago; John A. Edgerton, president, National Association of Manufacturers; John H. Fahey, Boston; Edward A. Filene and A. Lincoln Filene, Boston; W. W. Freeman, vice-president, Columbia Gas and Electric Co., Cincinnati; Philip H. Gadsden, vice-president, United Gas Improvement Co., Philadelphia; Carl E. Grunsky, San Francisco; Clarence Howard, president, Commonwealth Steel Co., Granite City, Ill.; Fred. I. Kent, vice-president, Bankers Trust Co., New York; Charles H. MacDowell, president, Armour Fertilizer Works, Chicago; Wm. C. Redfield, former U. S. Secretary of Commerce, Brooklyn; Alfred Reeves, general manager, National Automobile Chamber of Commerce, New York; E. W. Ryberg, Salt Lake City, delegate from the Associated General Contractors of America; Silas H. Strawn, chairman of board, Montgomery, Ward & Co., Chicago; Edward A. Sumner, American Radiator Co., Paris; F. W. Walker, president, Associated Tile Manufacturers, Beaver Falls, Pa.; F. D. Waterman, president, L. E. Waterman & Co., New York; Windsor White, chairman of board, White Motor Co., Cleveland.

The beautiful building and grounds of the Swedish Parliament Building, where all meetings of the Chamber were held

How to Get Practical Results from the World Economic Conference

Extracts from the address of Sir Arthur Salter, head of the economic section of the League of Nations, before the congress of the International Chamber of Commerce at Stockholm

OUR task (in connection with the world's economic recovery), and in particular the task of this International Chamber of Commerce and of the forces and institutions which it represents, is at its beginning and not its end. The first stage was that of securing unanimous agreement from the conference of Geneva on sufficiently drastic, far-reaching and effective resolutions. This first stage has been accomplished with a success which has exceeded the most sanguine hopes of those who initiated the conference.

The second stage, and perhaps the more difficult, is that of securing the adoption, and application in practice to commercial policies, of the resolutions.

The nature of the task which lies ahead of us is perhaps most clearly shown by recalling the main substance of what the conference advised. I will confine myself to the most vital of the resolutions on commerce. The central theme of the conference was that trade barriers, and in particular tariffs, are too *high; too complex;* and *too frequently changed.* The recommendation on which it places most emphasis, is that *they should be reduced;* should be *simplified and unified;* and should be made *more stable.* Let us glance in turn at each of these three problems.

High Tariffs Harmful

As to the height the conference starts with four declarations: that the present high tariffs have a harmful effect on trade and production; that substantial improvement in economic conditions can be obtained by increased facilities for trade and commerce; that tariffs, though within the sovereign jurisdiction of the different states, are not a matter of purely domestic interest; and lastly that some of the causes which have resulted in increased tariffs (such as currency fluctuations) have now largely disappeared, while others are diminishing. In these conditons, the conference categorically declares that "the time has come to put an end to the increase in tariffs and to move in the opposite direction." It suggests four lines of action (1) independent action by the several states to remove or diminish tariff barriers; (2) concerted action through commercial treaties; (3) the abolition of the practice of imposing bargaining tariffs (tariffs de combat) in advance of negotiations; and (4) an examination by the Economic Organization of the League, in consultation with such organizations as this Chamber, and with the governments, as to the best methods of securing further action to the same end.

As to simplification and unification the conference asks the League to establish the appropriate procedure, while suggesting the following principles: that there should be a systematic customs nomenclature under a plan covering all classes of goods; but that a priority should be established among the various groups of commodities, a beginning being made with those classes for which a common nomenclature can be most readily introduced; that not only governments but the producing and commercial organizations should be asked to co-operate at every stage; that the common nomenclature, as worked out from time to time, should be made effective by bilateral or plurilateral conventions; that further simplification and merging of groups within the standard system of sub-division should be contemplated; and that in order to ensure the execution of engagements the League should propose measures of publicity, information and friendly settlement or arbitration.

Long-Term Treaties

As to the third desideratum, stability in tariffs, the conference declared that "a decisive step on the road to world reconstruction would undoubtedly be taken if the system of long term treaties securing equality of treatment were restored." And in this connection I may remark that whereas, before the war, commercial agreements normally had a duration of ten or twelve years, no less than 153 out of 180 post-war agreements recently examined were terminable within the year.

This then is the unanimous advice of what is perhaps the most authoritative body of experts that has ever met to discuss economic policies. I come to the two crucial questions: What are the chances that this advice will be adopted and applied in practice? How is this result to be secured?

The difficulties are only too obvious. At every vital point the decision of governments are required, decisions to change policies on which they have embarked, administrative systems and methods which they are working. All the trade barriers which the conference wishes to remove are buttressed both by fallacies and by vested interests; and some by what is, on a short view, a real national advantage. The obstacles to reform are greater than those which retarded the application of the financial recommendations of Brussels; and the direct motive power is in some respects weaker and less concentrated. The financial recommendations of 1920 required separate action by each state, in what was obviously its own direct interest. The economic recommendations of 1927 require, in large part, concerted or at least general action, in the interest of a general prosperity in which each country will enjoy a share, but a share not directly proportionate to its own action.

Happily there are powerful considerations on the other side. In the first place the conference brought out with great force and clearness the fact that the worst abuses which they condemned had arisen through causes which have now disappeared or are diminishing. As the causes are disappearing, it is at least easier to remove their effects. Stronger as a ground for hope perhaps is the fact that the conference revealed an already existing feeling, of much greater force and wider range than had been suspected, that the process of increasing barriers had gone too far and must be reversed. The conference could hardly have improvised or initiated such a movement; but by developing it, expressing it, and adding the consciousness of collective support, it has given it an immense increase of strength. Thirdly, we have the great collective influence of the members of the conference and of all those institutions, like the Chamber, who have collaborated with it. One hundred ninety-four members, attended by one hundred fifty-seven experts, appointed by governments and representing every kind of qualification and every shade of responsible opinion, have spoken unanimously and categorically and it is difficult to believe that their advice can be disregarded. Certainly the members themselves—and no men could be better judges of the difficulties—speak in terms which suggest not only hope but confidence. They look forward to the "beginning of a new era," they anticipate that "international commerce will successively overcome all obstacles in its path that unduly hamper it."

Effort Must Be National

I come now to the last, and most important question of all, how must effort be directed, to secure the desired result? There is no simple answer. But one thing is clear. International organizations—the Chamber and the League—may do much. But the greater part of the work is likely to be and must be national. Members of the Chamber may do a great deal in international conference and committee; but they can do even more in mobilizing the forces in their own countries and modifying the policies of their own governments.

Probably the most urgent and important thing at present is that governments should definitely adopt the recommendations of the conference, and declare their intention to make their policies conform to them. We have already had a splendid lead. Within a few days of the conference the Belgian government declared that it gave its full adhesion to the resolutions, and was prepared at once to come to an understanding with other countries on the lines laid down by the conference. M. Vandervelde followed this up by stating to the council of the League that for an exporting country like Belgium the adoption of the recommendations was a

matter of life and death, and that for such a country political independence was conditional upon a recognition of economic interdependence. M. Benes followed with a formal declaration that the Czechoslovakia government also adhered to the resolutions and intended to develop its policy in conformity with the principles which they embodied. Herr Stresemann then declared that the German government gave as full and unqualified an approval as the Belgian government; and had just taken a formal decision concurring in the conclusions and declaring itself ready to cooperate energetically in giving effect to them. I am circulating to all members a full report of the very remarkable declarations made both by these and other countries at the council of the League. Nothing could be so useful for our future work as a series of formal decisions and declarations, similar to those which I have quoted, from other countries. They would give a momentum to the movement which would be irresistible. They would determine the character, and accelerate the progress, in all the more technical and detailed work which must follow.

Mobilizing the Forces

In securing such results I suggest that those here present can play a part of the utmost importance. It means mobilizing every kind of appropriate force in each country; working through the press, through meetings, and by every method which can move public opinion and governmental action. I venture to suggest that this is more than an opportunity, that it is also a duty. M. Theunis, in his concluding speech, reminded the members of the conference that in voting for the resolutions they had each undertaken a personal, moral obligation, "to do all in their power to disseminate, to defend and to secure the triumph of the tasks they had formally proclaimed." Herr Stresemann, in addressing the council as rapporteur a fortnight ago said he was sure that the members of the council, which had convened the conference, would feel an equally strong moral engagement. May I suggest that the members of this International Chamber, whose advice has had such a determining influence on the conference's resolutions, have a similar moral responsibility—individual as well as collective—and acting severally in the respective countries as well as in international meetings—to do all in their power to secure that they are applied in practice.

I have purposely put in the forefront the need for action in each country in informing and arousing public opinion, in evoking and maintaining public interest, and in influencing the policy of governments, because I think it is at once the most urgent, the most difficult and the most important part of the task that lies ahead. Detailed execution will go as far as, and no further than, national policies allow it: international action can gather the harvest, as it sowed the seed, but it can only help here and there in the intermediate work.

At the same time there is much that can, and must, be done by international organizations. The Economic Committee of the League is meeting in a few days' time to consider a plan for the tariff questions and to study in particular how to organize the work on customs nomenclature; and in September the council has announced its intention of considering changes in the constitution of the League's economic organization. If, however, you will not consider it an impertinence, I should like now to suggest, in the barest outline, what this Chamber, and its members can do.

First: Whether as individuals or as organizations the members, each in their own country, in conjunction with the members of the Economic Conference with the national chambers of commerce and with the national committees and all other persons and institutions that can be used for the purpose in the same country, can arouse and maintain public opinion; and secure that the recommendations of the Economic Conference are proclaimed and debated in public meetings and in parliament; can assist their governments to adopt the policy of the conference and to make declarations similar to those made by Belgium, Germany and Czechoslovakia; and can secure that actual commercial and economic policy is modified accordingly.

Second: The chamber, here in Stockholm and through its central council, can appoint special standing committees for each of the main tasks, including for example one on customs nomenclature, and one on general tariff and commercial policy questions. It would be the task of these committees to organize efforts and work both internationally through appropriate sub-committees, through special experts, through trade committees, and through the national committees of the chamber, and in close contact with the League.

Industrial Co-operation

Third: At this conference at Stockholm members of the same or closely associated trades and industries of different countries might meet and begin discussions as to the best methods by which trade barriers can be removed or reduced in the sphere with which they are specially concerned. So far as such discussions contemplate anything in the nature of international industrial agreement they would doubtless be guided by the principles laid down in the report of the Economic Conference. I suggest discussions between closely associated industries, including, for example, a primary industry and the industry which uses its products as its own raw materials, and between similar industries of different countries, because such discussions are favorable to a genuine attempt to remove trade barriers in the particular economic sphere which they cover.

Fourth: The national committees of the chamber, which did much valuable work in preparing the resolutions of the Economic Conference might meet with the definite purpose of organizing the efforts within each country to secure their adoption. In this case I suggest the committees should meet as a whole, including all trades and industries, and should divide their work rather by subject than by industry; for group meetings of a particular industry within a single country are not the most favorable means of securing tariff reductions.

Fifth: The International Chamber will doubtless take all the necessary measures to collaborate with the League both by the methods already in operation and any others that may seem desirable. I cannot of course anticipate the decisions of the council of next September as to changes in the League's present organization. But I may, I think, say at least this without indiscretion: I cannot conceive any plan of reorganization which does not include within it not only provision for the continuance of the present collaboration, but facilities for even closer, more intimate and more extensive association between the two institutions which are both so vitally interested in the common task left by the Economic Conference.

Guidance of the Conference

We have in the resolutions of the Economic Conference the unanimous advice of the most authoritative body of world experts that has ever met as to the direction in which the economic policies of the world ought to develop.

We have their considered opinion that the adoption of what they recommend will substantially increase the prosperity of the world.

We have their equally authoritative and unanimous opinion that not only the increased prosperity but the maintenance of the peace of the world depends largely upon economic policies being transformed as they desire; for the evils they wish to remove cause not only loss but friction, they are obstacles not only to the growth of trade but to international good will.

Surely, if the unanimous advice of a conference so appointed and so qualified is disregarded, we shall begin to despair, not only of one conference, but of international conferences in general; despair instead of reason itself, or at least of collective reason, as the guide to the government of the world.

In this tremendous, and still doubtful, issue may I express my conviction that this International Chamber, its members acting individually and collectively, the great institutions which they represent and the powerful forces which they influence, can play an immense and perhaps a decisive part. With your wholehearted aid, but scarcely I think without, we may hope for the realization of what the members of the conference declared to be their unanimous desire that we shall now see the "beginning of a new era, during which international commerce will successively overcome all obstacles in its path that unduly hamper it, and resume that general upward movement, which is at once a sign of the world's economic health and the necessary condition for the devlopment of civilization."

The Business Barometer

This week's outlook in Commerce, Finance, Agriculture and Industry

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

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A PROMINENT New York bank officer received a few days ago a letter from a banker in the Middle West, of which the following is an extract:

"There is so much money in the country that it is strictly a case of survival of the fittest. In the rich creditor nations of Europe prior to 1914 they used to have long eras of prosperity, running 20 to 30 years. I am inclined to believe that we are in for an era of selective prosperity where the best managed companies in sound industries will go far ahead and owners of securities in these companies will also be happy with the results.

"I think that concentration of big capital in very successful companies will carry them to unheard of prices."

This letter puts into words what many business men are thinking, or perhaps only intuitively feeling. Applied to the economic complex as a whole, it foretells a stability that is encouraging, though many will not find it exhilarating because competition will continue keen and business brains, efficiency, and energy will be at a premium. Fortunately, this stability is not much threatened by over-confidence, because there are too many obvious reasons for caution —not the least of which is the high level of security prices which the letter discusses—and if no boom impends we ought to be willing to give up booms as the price of relief from depressions.

"Selective prosperity" is a phrase that the commentators on business have greatly favored this year, and it describes the present state of commerce and industry in the United States perhaps better than any other. It explains accurately such apparent anomalies as record high prices for many industrial securities accompanied by a distinct recession in industrial activity; a satisfactory volume of trade going hand in hand with an unusually large number of business failures; and the greatest individual buying power in our history co-existent with repeated demands from the country's largest group of producers, the farmers, for legislative relief to restore them to an economic parity with workers in industry. Only in a country whose commercial activities are as broad and as diversified as those of the United States could such contradictions exist and business still merit the description of "good."

Those whose attention is fixed solely on the record of a few major industries may dispute the statement that business is good, but where the decline in activity is severe, it can be explained partly by seasonal influences. And though it seems paradoxical it is nevertheless true that a period of summer quietness in industry provides one of the best bases for a satisfactory autumn. Because such a large excess factory capacity exists, the recurring problem of manufacturers is to keep production adjusted to consumption, and summer automatically contracts the one end expands the other, gradually exhausting accumulated stocks and leading to re-expansion of fall business. It is rightly said in the speculative markets that a recession is bullish after it is over, and the same truism applies to business.

The automobile industry is a case in point. Considered as a whole, with Ford's low output included, the first half year was confessedly disappointing. Production in the United States was only 2,027,840 cars and trucks, compared with 2,305,877 in the first half of 1926. The June output of 314,552 was much the lowest since February, and compares with 395,674 in May and 380,372 a year ago. But of course the prospect for sustained activity in the industry during the second half year is better than if production thus far had been heavier, and there is reason to expect that the output between now and next January may more closely approach that for the corresponding period last year, which was about 1,900,000. Ford is already taking on more men.

Bonds also are doing better as the ease of money has aided in the digestion of the surplus with which the market was recently afflicted. Call money on the New York Stock Exchange last week loaned as low as 3½ per cent, and all other money rates have declined by an eighth to a quarter. The Federal Reserve Banks are discounting only $400,000,000 of paper, and they continue to report a high reserve ratio.

In the larger business sense, all eyes are properly upon the crops. That the farm income will be materially less than last year seems improbable, although on the basis of its July 1 crop figures the Department of Agriculture estimates this income at $590,000,000 less, or about a 5 per cent decrease. It says, however, that the difference is due to the decline in cotton, which has been remedied by the advance in that market since the calculation was made.

The iron and steel industry sends out slightly more cheerful reports and the reviews agree that the improvement both in production and orders which is always expected to develop in mid-summer in preparation for fall business is already setting in. Building still is actively maintained at very little under the record levels and as long as money continues abundant it seems that the work of physically remodeling the United States—for that is what is going on—will continue.

WHAT'S DOING IN INDUSTRY

THE VOLUME of current sales in important industrial centers promises to give July a better total than was hoped for by many manufacturers of and dealers in machinery and machine tools. Large industrial plants are not active buyers, though many of them have re-equipment programs under way. Small shops and miscellaneous users are furnishing the bulk of business today.

THE SOUTH reports a slow but steady improvement in demand from woodworking and textile plants. Sales in Canada are holding up, with good prospects from railway and building projects. Orders resulting from old quotations are breaking in New York, but few new inquiries have been received. New England continues its steady progress, with aircraft activities leading the way.

THE MID-WEST is more active, with Detroit beginning to feel the first signs of buying by the automobile industry. Demand is holding up in Cincinnati and the general trend is upward. A fair volume of small orders encourages dealers in Indianapolis. Chicago reports light buying activity.

"SELECTIVE PROSPERITY" is the term applied to the economic complex of business in the United States at present. It foretells a stability that is encouraging, though fostering keen competition of brains and money.

The Industrial Review

Weekly progress of the machinery and machine tool business

THE following reports, gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

DETROIT

The machinery market in the Detroit district continues to improve. Last week there was noted a definite change in the condition of the general machinery industry. For several weeks there has been a prevailing spirit of optimism. Last week this optimism became a tangible thing and several large orders gave promise of still more material things to come. This week the orders continue to drift in and inquiries are coming in faster than they have come in many months.

Some of the larger dealers have not yet felt the full force of the improvement and many of the tool shops are still idle, but there seems to be little doubt that the general situation is decidedly better.

Several dealers have reported large orders and many have indicated that still larger orders are on the way. Most of the big automobile plants are doing a little buying. Ford is still making purchases; Dodge, Hudson, Paige, Chrysler, Oakland and Buick are all doing some buying. The new Dodge "Four" will necessitate some adjustments in the plant and the "Six" will also bring about some plant changes.

CHICAGO

Such activity as has been noted in the machine tool industry during the last week has been limited to the sale of single tools and small lots, mostly for replacement purposes and originating in general industrial plants and machine shops. Reports from dealers handling a general assortment of standard tools are to the effect that business for July, thus far, has shown a slight improvement over that of June, but that it still leaves much to be desired.

Inquiries are desultory, and indefinite as to probable time when equipment will be needed, the matter of price seemingly being the most important factor. Demand for small tools continues fairly active, particularly in pneumatic tools, the local representative of one concern stating that there has been no decline in sales for several months. Railroads are doing no buying beyond bare replacement necessities, and the closing of the last remaining items on old lists. The market for used tools is dull, dealers reporting little demand.

CINCINNATI

Some manufacturers in the Cincinnati district report that the demand for machine tools has held up fairly well in the past week, but others report that there has been a slight falling off in sales. Selling agents report that business held up very well with them.

Both branches of the trade report that sales are at a better level than at this time last year and feel that there is no danger of a material falling off in demand. As the season advances, it is thought, the sales curve will take an upward trend and continue to ascend until a fair level is reached.

The greater portion of the orders received during the week called for single tools and replacements, these coming from general machinists and miscellaneous users, but scattered among them were a few orders for two or more tools. The week's sales were well scattered geographically and they were well diversified as to types and sizes. A small number of orders came from automobile manufacturers and from railroads.

Inquiries are reported to have held up to a very good level through the week, but they were almost altogether confined to requests for information in regard to single tools of the efficiency type.

CANADA

Demand for machinery and machine tools in Canada is holding up exceptionally well for this time of the year. Optimism prevails in most lines of the metal-working industry, and it is fully expected that much business foreseen in the first half of the year will shortly materialize, while good prospects are held out for new business.

One important agricultural implement firm has replaced its entire drilling equipment to the extent of $10,000. The purchase was the result of the installation of two tools at the end of 1926, which showed such economies that the recent move was deemed imperative.

The railways are doing considerable buying. The Canadian National has ordered 30 dump cars from the National Steel Car Corporation, and the Canadian Pacific Ry. has purchased two steel flat cars. The Alberta and Great Waterways Co. has ordered three locomotives from the Canadian Locomotive Co. The Canadian Pacific Ry. has placed a 10,000-ton rail order with the British Empire Steel Corporation.

The Steel Co. of Canada states that sales to farmers so far this year have been equal to last year, which were the greatest in the company's history. One of the most promising signs of continued industrial activity during the balance of the year, is the large amount of proposed building to be undertaken. The figures for the last half of the current year are $384,981,000, as compared with $304,598,000 in the same period last year.

NEW ENGLAND

Indications of improvement in the machinery industry in New England are apparent from developments in the past week. Production in some machinery plants is increasing, and plans for further expansion have been announced. Connecticut has come to the front in airplane manufacture. The Aircraft Corporation of America expects to be in production at New Milford, Conn., before the end of the year. Then there is the plan of Pratt & Whitney Aircraft Corporation, Hartford, Conn., to double its production.

The typewriter industry in Hartford and Bridgeport calls for bigger production schedules. The hardware trade is improving and the Eagle Lock Co. at Terryville, Conn., has increased its working hours from 8 to 10 hours daily. In New Britain better conditions prevail. Preparations for the reopening of the Connecticut Electric Steel Co. plant are progressing.

SOUTHERN DISTRICT

Though machinery and tool business in the Southeast in the past two weeks has continued to show a slow but steady improvement, sales are not yet up to expectations save on a few lines, due to the fact that adverse conditions affecting business in this section render the future more or less uncertain, and cause even the largest buyers to place their orders on a conservative basis.

There is still a brisk demand for woodworking machinery, mainly in the furniture manufacturing field in the Georgia, North Carolina and east Tennessee territories. Road-building equipment sales are reported fairly active. Contractors' equipment is showing a slight improvement following a lull during May and June, but neither will this trade be as large as during the 1926 season because there is not as much new building going on in the Southeast this year outside the larger industrial centers like Atlanta, New Orleans and Birmingham.

Railroads are buying fairly well for new shop projects now under way, and indications are, judging from the tone of their present inquiry, that they will continue fairly good buyers the rest of the summer. Textile equipment sales are still reported fairly active in the Georgia, Alabama, east Tennessee and Carolina territories, but less active elsewhere. Most of the present sales are to new textile plants now being established in these states.

INDIANAPOLIS

Little change is to be seen in the machinery and machine tool market here, though several dealers say they can see a slight improvement. No large lists are being received, but several smaller sales are noted. However, in view of general conditions, the trade does not seem pessimistic. Demand from the automobile industry during the past two weeks has been light and promises to remain in this condition for another month. This, the trade declares, is entirely seasonal and must be expected each summer.

However, there is a good demand for special machinery and tools from the public utilities, particularly the water and gas companies, both of whom are buying much equipment. The electric interurban lines also are doing a considerable amount of replacing and repair work.

A good demand continues for contractors' equipment, particularly in the road construction lines. Demand for building contractors' equipment is lighter than last year. The coal operators, particularly the smaller operators, are beginning to make inquiries, but little actual business is expected until the end of the strike is in sight.

NEW YORK

Business in this market continues at a fair rate, considering the season and the many adverse influences. Industrial plants in this territory are maintaining a rather uncertain activity and their demand for machine equipment has been along the same lines. Inquiries from general manufacturers are scarce, most of the orders being placed now being the result of much previous sales effort on the part of local agents. It is believed that the total volume of business for July will fall behind that of June, unless the next few days bring considerable action.

Rumors were abroad in this market last week to the effect that the Argentine Naval Commission, which is established in New York, had issued a list asking for quotations on a large number of tools for the equipment of a naval base at Bahia Blanca. Investigation showed that this list called for prices only on three universal milling machines and five lathes. No other purchases are contemplated, although a large plant is in prospect.

Technical Discussions at Canada's Exposition

Several organizations in Canada's metal working and power generating fields are sponsoring an exposition in the new University of Toronto Arena, Aug. 31, Sept. 1 and 2, which to date includes 104 exhibitors and six technical sessions.

There has not been held in Canada a mechanical engineering show that could, in any sense, be regarded as comprehensive. There have been well-meaning attempts, from time to time, by individual associations and annual exhibitions, but they have not been very successful.

The associations sponsoring this show are not depending on the exposition of equipment and materials. Recognizing that progress in production ingenuity must be supplemented by informative discussions of the most recent developments, six technical sessions have been arranged to be addressed by outstanding leaders in various fields, discussing problems arising in the every day operation of both plant and powerhouse.

The committee intrusted with this work is headed by W. J. Blair, of the Canada Cycle and Motor Co. Frank L. Eidmann, of the School of Engineering, Princeton University, will discuss "Materials Handling as a Factor to Production." J. F. Lincoln, of the Lincoln Electric Co., Cleveland, will deliver an address on "The Redesign of Present Riveted and Cast Structures to the Use of Arc Welding and Structural Steel." F. S. Collings, mechanical engineer, Sargent & Lundy, Chicago, whose subject will be "Burning Coal in Pulverized Form." C. A. Thinn, research engineer, C. A. Dunhim Co., Marshalltown, Iowa, will discuss "Reducing Overheating by Controlling Steam." O. W. Ellis, research metallurgical engineer, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., and well-known in Canada as a University of Toronto educator, will present a paper on "Developments of the Last Ten Years from the Physics-Metallurgical Viewpoint." John Howe Hall, research engineer, Taylor-Wharton Co., will review in detail the "Properties of Manganese Steel." A. N. Otis, industrial heating engineer, General Electric Co., has chosen as his subject "Relative Economy of Electric and Fuel-Fired Furnaces." T. Holland Nelson, Conshohocken, Pa., will deal with "Recent Developments and Application of Chromium Irons and Steels in the Fields of Corrosion and Heat Resistance." W. S. Quigley, president of the Quigley Furnace Specialties Co., New York, will discuss "High Temperature Cement versus Fire Clay."

Because of the limited hotel accommodations available in Toronto while the Canadian National Exhibition is in full swing, arrangements have been concluded with several of the college affiliated with the University of Toronto, for the rental of their residence accommodations to out-of-town exhibitors and visitors to the show. The sponsors of this show include: The Toronto and Montreal Chapters of the American Society for Steel Treating; Canada, Toronto and Hamilton Councils, Universal Craftsmen's Council of Engineers; Canadian Section, American Welding Society; Dominion Executive, Toronto No. 1 and Hamilton No. 3, Engineers' Mutual Benefit Fund; Toronto branch, American Electroplaters' Society, and the Montreal and District Engineers' Association. Co-operating are the Ontario section, American Society of Mechanical Engineers, Engineering Standards Association and the Industrial Accident Prevention Associations.

Management Session at Rochester by A.S.M.E.

The professional divisions of the American Society of Mechanical Engineers, have a new policy of holding meetings in different parts of the country for their separate divisions. The first of these meetings, to be held by the Management Division, will be in Rochester, Oct. 24 and 25. This meeting is in co-operation with the American Management Association and with the local section, A.S.M.E. of Rochester, of which Ronald C. Hands is chairman. These meetings are to be national in scope and should be of interest to more than the immediate locality. The speakers are being selected from a wide area and will include many prominent engineers. The subjects to be covered are as follows: "Co-ordinating Wage Incentives and Production Control"; "Co-ordinating Quality Control and Production Control"; "Management's part in Maintaining Prosperity."

The latter is the Management Week subject and this session will be in charge of the local Management Week Committee consisting of Virgil M. Palmer, chairman, F. W. Lovejoy, James E. Gleason, Carl S. Hallauer, Frank W. Moffett, Donald S. Barrows, Walter L. Todd and A. E. Crockett.

Building Construction Maintains Volume

The national construction survey just completed by the American Construction Council shows that while for the country as a whole construction activities for the first six months of 1927 may be slightly less than for the first six months of 1926, a very high volume is still being maintained. The present prospects are encouraging for a well-sustained season in building operations, with a large volume of engineering construction underway and projected.

A distinct attitude of caution prevails, a situation which in general is favorable to legitimate building construction with better construction more and more in demand. Conditions, however, are somewhat spotted as to volume, each locality following more and more the dictates of supply and demand as contrasted with speculative building.

Human Relations School Convenes in Italy

The first summer school held under the auspices of the International Association for the Study and Improvement of Human Relations and Conditions in Industry held its week of meetings at Baveno, Italy, June 19 to 25. The subject chosen for study was "The Elimination of Unnecessary Fatigue in Industry," and was the outcome of a discussion on the human element in industry which took place at the meeting held last summer at the Rigi-Scheidegg, Switzerland. Dr. Lillian M. Gilbreth, American consulting engineer and psychologist, made a special trip from the United States to Italy to act as chairman of this school, and the speakers were leaders in various fields that have to do with fatigue study. The entire group, lecturers and students, represented both sexes, coming from fifteen nations and with many types of education and experience.

Course of Ten Lectures

A well balanced program was presented by the ten lecturers. Dr. Loriga of Rome and Mme. Thumen of Paris outlined the history of work in this field, and furnished not only an account but an evaluation that was most significant. Dr. Lipmann of Berlin in two lectures rich in information presented graphically and clearly present day knowledge on the length of work and rest periods. This was supplemented by lectures from Dr. Vernon and Mr. Weston, both of the Industrial Fatigue Research Board, London, giving valuable and practical information of work being done in attempting to eliminate the evil effects of extremes of temperature, dust, damp and eye strain. These four lectures, with one by Mr. Piacitelli, of the Barber Asphalt Co., U. S. A., showing applications of fatigue elimination in industry, and especially in teaching new work, served to give a good idea of the fatigue study as practiced today.

The remaining three lectures, given by Prof. Pear of Manchester, England, indicated the relation of work to temperament and to self-expression. Prof. Pear showed not only the underlying causes of much that has occurred, but suggested possible developments and stimulated the group to a new attack on the fundamental roots of fatigue.

As was to be expected from a group containing workers, managers, scientists, factory inspectors, social workers, etc., the discussion was prolonged and interesting, the main points of which will be incorporated along with the papers in the forthcoming report of the school, which may be obtained from the headquarters of the association at Goethestrasse 10, Zürich, Switzerland.

The group unanimously agreed that more such summer schools should be undertaken. Next year brings the triennial congress; but undoubtedly a school on some related subject will be held in the summer of 1929 at a place to be decided later.

Personals

C. S. JARRELL has been elected president and manager of the W. G. Jarrell Machine Co., of Charlotte, N. C.

HERMAN C. SCHUETTE has been appointed assistant trade commissioner in Paris for the Department of Commerce.

WALLACE J. HORNELL has joined the staff of the Arthur Jackson Machine Tool Co., of Toronto, Canada. He will specialize in portable electrical equipment for toolroom use.

W. W. WIXSON has been appointed district sales manager of the central district for the Bonney Forge and Tool Works, Allentown, Pa.

E. T. SPROULL has resigned as sales manager of the Oliver Iron and Steel Corporation, of Pittsburgh, and has become commissioner of the Cold Rolled Strip Institute, of Pittsburgh.

PAUL O. REYNEAU has become associated with the Cutter Electrical and Manufacturing Co., of Philadelphia. He was formerly consulting engineer for the American Gas Co., of Philadelphia.

THOMAS H. WINSTON has been appointed to represent the Skinner Chuck Co., of New Britain, Conn., in the South and Southwest. He will have permanent headquarters at 1133 Real Estate Bldg., Philadelphia.

JOHN A. TOLEIK has resigned from the engineering staff of the American Can Co., and has become chief engineer for the Gibb Welding Machines Co., of Bay City, Mich. Mr. Toleik will have charge of the research developments of the company.

W. G. NICHOL, formerly of the New York office of Manning, Maxwell & Moore, Inc., has been appointed direct factory sales engineer in the Connecticut and western Massachusetts territories for the Barnes Drill Co., of Rockford, Ill. Mr. Nichols will be located for the present in Stamford, Conn.

Business Items

The White Star Refining Co., announces the removal of its Detroit offices to the White Star Bldg., 903 W. Grant Blvd.

The Dillon Machine Shop, Farriday, La., has acquired a site for construction of a new plant, it is announced by George F. Dillon, president of the company.

The Price, Watson Co., 80 E. Jackson Blvd., Chicago, has been incorporated to manufacture and deal in iron and steel railway supplies, machinery, brass and metals of all descriptions.

The Stroebel Steel Construction Co. has purchased a strip of vacant land 125x660 ft., at 4748 Forty-seventh St., Chicago, adjoining its present property, which will be used for storage purposes.

The General Electric Co. has established a custom molding business under the managership of E. O. Shreve, of the Industrial Department. The products will be marketed under the trade name "Textolite."

The Taylor Plow Co., of Cleveland, Tenn., a new concern, is establishing a plant there including foundries and machine shops, for the manufacture of a new type of tractor plow invented by Herchel Taylor, of Benton, Tenn., one of the officers of the company.

Struck by lightning at the height of a severe electrical and wind storm which swept over the district on June 26, the big sawmill of the Canadian International Paper Co., at Rockland, Ontario, was completely destroyed by fire, entailing a loss of between $100,000 and $130,000.

The Apco Manufacturing Co., of Providence, R. I., has purchased the Frank Mossberg Corporation, of Attleboro, Mass. The name of the combined companies has been changed to the Apco Mossberg Corporation, and the main offices have been established at Attleboro. Thomas F. Wilson is president of the new organization.

The Brown-Craven Equipment Co., 706 Manning St., North Chattanooga, Tenn., a new firm recently formed for the handling of new and rebuilt machinery and tools in the Southeast, has been appointed distributor of equipment manufactured by the Construction Machinery Co., of Waterloo, Ia.

The Chicago, Milwaukee & St. Paul Ry. has started work at Tomah, Wis., a division headquarters, on the erection of a group of buildings to be used for rail reclamation. Equipment will be installed for reconditioning worn and defective steel for relaying. John Reihner is superintendent of the Tomah division.

The Fairchild Lock Co., Southington, Conn., which recently acquired the real estate and plant of the Rowe Calk and Chain Co., at Southington, has completed renovations and repairs on the buildings, and will shortly being the manufacture of a patented automobile locking device. The Fairchild company has filed notice of a change in name and will operate as the Connecticut Specialties Co.

The Wire Machinery Corporation of America, Inc., New Haven, Conn., has incorporated to succeed the New England Wire Machinery Co., and accommodate a receivership of the latter concern. Raymond B. Gerard, president, has announced that new capital has been secured. Other incorporators are: Merritt D. Vanderbilt, Stratford, Conn.; and Frederick C. Hesselmeyer, Hamden.

The Pratt & Whitney Aircraft Co. now has contracts for the production of "Wasp" and "Hornet" engines with spare parts to the amount of $1,500,000, an order just placed by both Army and Navy departments being for $1,000,000. This is leading to considerable expansion of the present facilities of the company, which will take place over a period of the next several months.

The Thomson National Press Co., Long Island, N. Y., manufacturer of presses and cutters, has acquired the four-story plant of the Golding Division of the American Type and Foundry Co., at Franklin, Mass. The new acquisition will be utilized for manufacturing purposes and the Thomson company will manufacture in addition to its own line, repair parts for Golding presses.

The merger of the Power Specialty Co., and the Wheeler Condenser and Engineering Co., has been announced. The companies manufacture a line of auxiliary power plant and oil refinery equipment. The assets, plants and subsidiaries of both companies will now be assembled under one corporate name—the Foster-Wheeler Corporation. No change in the management is contemplated. J. J. Brown is chairman of the board, and L. B. Nutting is president. W. F. Keenan, Jr., is chief engineer.

The Monarch Machine Tool Co., of Sydney, Ohio, has established its New York office in the Graybar Bldg., 420 Lexington Ave. The staff is composed of Herbert S. Lester, formerly representative in upper New York state for Manning, Maxwell & Moore, Inc.; J. W. Dunn, formerly New York City and Brooklyn representative for Manning, Maxwell & Moore, Inc.; and C. L. Cameron, formerly sales and advertising manager for Gould & Eberhardt, of Newark. Mr. Lester and Dr. Dunn divide their time in the New York territory, while Mr. Cameron covers northern New Jersey.

The sale of the Sawyer-Massey Co. to new interests, authorized by shareholders on April 19, has been completed. T. A. Russell, president of Willys-Overland, Ltd., of Canada, is president of the new company, which will operate under the name of Sawyer-Massey, Ltd. The vice-president is R. H. Mulch, president of the Ontario Tractor Co., and at one time vice-president and general manager of the Chevrolet Motor Co. in Oakland, Calif., later vice-president and general manager of the Durant Co. of Canada. The other directors are: Chester J. Harris, of Brantford, son of one of the founders of the Massey-Harris Co.; H. H. Champ, of Hamilton, vice-president of the Steel Co. of Canada; G. R. Cottrelle and J. F. Lash.

Obituaries

DR. ARTHUR A. HAMMERSCHLAG, president of the Research Corporation of the Carnegie Institute of Technology, died on July 20 in New York City. Dr. Hammerschlag was sixty years old. He at one time was director of industrial research in the office of Maj. Gen. Goethals, and also did consulting work in electrical and mechanical engineering.

WILLIAM GRISCOM COXE, president of the Pusey & Jones Corporation, shipbuilders, died at his home in Bellevue, Del., near Wilmington, on July 4. Although in ill health for some months, Mr. Coxe had not been confined to his home until a short time before his death. He was fifty-seven years old. Mr. Coxe graduated from the Royal Technical College in Berlin in 1891, serving an apprenticeship as a marine engineer with the J. and W. Thompson Co., Clyde Bank, Scotland. From 1898 to 1904, Mr. Coxe was foreign representative and general superintendent of the William Cramp & Son Ship and Engine Building Co., in Philadelphia.

Forthcoming Meetings

Steel and Power Show. First Steel and Power Show in the Varsity Arena, Toronto, Canada, sponsored by the Montreal and Toronto Chapters of the American Society for Steel Treating; by the Canada, Toronto and Hamilton Councils of the Universal Craftsmen's Council of Engineers; by the Engineers' Mutual Benefit Fund; the American Electroplaters' Society; and the Canadian section of the American Welding Society. Aug. 31 to Sept. 2. General chairman, C. Bradshaw, 153 University Ave., Toronto, Canada.

American Railway Tool Foremen's Association. Fifteenth annual meeting, Hotel Sherman, Chicago, Aug. 31, Sept. 1 and 2. G. G. Macina, secretary, 11,402 Calumet Ave., Chicago.

Machine Tool Exhibit. Seventh annual machine tool exhibition under the auspices of the New Haven Section of the American Society of Mechanical Engineers, the Department of Mechanical Engineering of Sheffield Scientific School, Yale University, and the Chamber of Commerce of New Haven: At the Mason Laboratory, Yale University, Sept. 6 to 9. Harry R. Westcott, chairman of the exhibit committee, 400 Temple St., New Haven, Conn.

American Society for Steel Treating. Ninth annual convention and national steel exposition, Detroit, week of Sept. 19. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland.

Society of Automotive Engineers. Production Meeting, starting at Hotel Winton, Cleveland, Sept. 19 and 20; continuing at Hotel Statler, Detroit, Sept. 21 and 22. C. E. Heywood, manager of meetings, 29 West 39th St., New York City.

American Welding Society. Fall meeting, Book-Cadillac Hotel, Detroit, Sept. 19 to 23. M. M. Kelly, secretary, 29 West 39th St., New York City.

Institute of Metals. Sectional meeting, Hotel Statler, Detroit, Sept. 19 to 23. H. Foster Bain, general secretary, 29 West 39th St., New York City.

National Steel and Machine Tool Exposition. Under the auspices of the American Society for Steel Treating. Convention Hall, Detroit, Sept. 19 to 23. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

Machine Tool Builders' Exposition. First annual machine tool exposition, conducted by the National Machine Tool Builders' Association, at the West Annex of the Public Auditorium, Cleveland, Ohio, Sept. 19 to 24. J. Wallace Carrel, vice-president and general manager, the Lodge & Shipley Machine Tool Co., Cincinnati, chairman of the exposition committee. Roberts Everett, manager of the exposition, Pennsylvania Bldg., New York. Ernest F. DuBrul, general manager of the association, 826 Provident Bank Building, Cincinnati, Ohio.

The Weekly Price Guide

Rise and Fall of the Market

FINISHED steel prices appear firmer with materials in better demand than a week or more ago. Improvement has also developed in the non-ferrous metals market. Directly opposed to the foregoing is the present condition of pig iron. Prices in the latter are at the lowest point reached since 1922. Demand is also slower for agricultural implement material, cold finished bars, bolts, nuts and rivets. The oils are nearly all in a weaker price position, particularly in New York and Cleveland. Scrap copper rose with the market in electrolytic, while old brass and lead declined. Bars are $1.75@$1.90 per 100 lb., base, Pittsburgh; shapes and plates, base, bring $1.75@$1.85 per 100 lb., f.o.b. mill.

(All prices as of July 22)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$22.19
Northern Basic	20.89
Southern Ohio No. 2	21.19
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	26.37
BIRMINGHAM	
No. 2 Foundry	17.25
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	22.76
Virginia No. 2	27 17
Basic	21.76
CHICAGO	
No. 2 Foundry local	21.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	23.55
PITTSBURGH, including freight charge ($1.76) from Valley	
No. 2 Foundry	20.26
Basic	19.76
Bessemer	21.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.50@4.75
Cleveland	5.00@5.25
Cincinnati	5.00@5.50
New York	5.25@5.50
Chicago	4.75@5.25

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.25	3.50	3.25	3.89
No. 12	2.30	3.55	3.30	3.94
No. 14	2.35	3.60	3.35	3.99
No. 16	2.45	3.70	3.45	4.09
Black				
Nos. 18 to 20	2.80	3.75	3.75	4.00
No. 22	2.95	3.90	3.90	4.15
No. 24	3.00	3.95	3.95	4.20
No. 26	3.10	4.05	4.05	4.30
No. 28	3.25	4.20	4.20	4.45
Galvanized				
No. 10	3.15	4.10	3.95	4.25
Nos. 12 to 14	3.25	4.20	4.05	4.35
No. 16	3.35	4.30	4.15	4.45
No. 18	3.50	4.45	4.30	4.60
No. 20	3.65	4.60	4.45	4.75
No. 22	3.70	4.65	4.50	4.80
No. 24	3.85	4.80	4.65	4.95
No. 26	4.05	5.05	4.90	5.20
No. 28	4.30	5.30	5.15	5.45

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv
1 to 3 in. steel butt welded	53%	39%	55½%	43½%	54%	41%
2½ to 6 in. steel lap welded	48%	35%	53½%	40½%	51%	38%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 4% less 5%. Cast iron, standard sizes, 36-5% off.

Size, Inches	List Price per Foot	Diameter in Inches — External	Diameter in Inches — Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at warehouse in lots of less than 100 ft. or 100 lb.:

Thickness — Decimal	B.w.g. and Fractions	Outside Diameter in Inches — ¼	⅜	½	⅝	1	1¼	1½
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	....	4.65
Spring steel, heavier	4.00	....	4.00
Coppered Bessemer rods (base)	6.05	6.00	6.20
Hoop steel	4.49	3.65	4.15
Cold rolled strip steel	6.25	6.35	6.25
Floor plates	5.25	5.30	5.00
Cold drawn shafting or screw	4.00	3.90	3.60
Cold drawn flats, squares	4.50	4.40	4.10
Structural shapes (base)	3.34	3.10	3.10
Soft steel bars (base)	3.24	3.00	3.00
Soft steel bar shapes (base)	3.24	3.00	3.00
Soft steel bands (base)	3.99	3.20	3.65
Tank plates (base)	3.34	3.20	3.10
Bar iron (2.75 at mill)	3.24	3.21	3.00
Drill rod (from list)	60%	55%	50%

Electric welding wire, New York, 3/32, 8.35c.; ⅛, 7.85c.; 5/32 to ½, 7.35c. per lb. *Flat, 3/16@¼-in. thick.

METALS

Current Warehouse Prices in Cents Per Pound for Small Lots

Copper, electrolytic, up to carlots, New York			14.12½
Tin, pigs, 5-ton lots, New York			65.62½
Lead, pigs, up to carlots, E. St. Louis 6.10		New York...	7.00
Zinc, slabs, up to carlots, E. St. Louis 6.22½		New York...	7.12½

	New York	Cleveland	Chicago
Antimony, slabs, ton spot	15.00	17.50	13.00
Copper sheets, base	21.25	21.50	21.25
Copper wire, base	18.00	18.25	14.50*
Copper bars, base	20.75	21.25	20.75
Copper tubing, base	23.25	23.50	23.25
Brass sheets, high, base	17.50	17.75	17.50
Brass tubing, high, base	22.37½	22.62½	22.37½
Brass rods, high, base	15.25	15.50	15.25
Brass wire, high, base	18.00	18.25	18.00

*Mill

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminium ingots, 98 to 99%, 1 to 15 ton lots	26.00	26@27	26.02
Zinc sheets (casks)	11.00	11 30	10.11
Solder (½ and ½), (case lots)	39.00	42.00	38½@42½
Babbitt metal, delivered, New York, cents per lb.:			
Genuine, highest grade			82.00
Commercial genuine, intermediate grade			61.00
Anti-friction metal, general service			31 50
No. 4 babbitt (f.o.b.)			13.00
Nickel, f.o.b. refinery, cents per lb.:			
Ingots 35.00	Electrolytic 39.00	Shot	36 00

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Hot rolled nickel sheet (base)	52.00
Cold rolled nickel sheet (base)	60.00
Hot rolled rods, Grade "A" (base)	50.00
Cold drawn rods, Grade "A" (base)	58.00

Base price of Monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	32.00	Hot rolled rods (base)	35.00
Blocks	32.00	Cold drawn rods (base)	43.00
Cold rolled sheets (base)	50 00	Hot rolled sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Crucible heavy copper	11 12½@11.37½	10.50	9.75@10 25
Copper, heavy, and wire	10.37½@10.87½	10.50	9.00@ 9 50
Copper, light, and bottoms	9 12½@ 9.62½	9.00	8.00@ 8 50
Heavy lead	5 00 @ 5.25	5.25	4.50@ 4 75
Tea lead	4.00 @ 4.25	3.25	3.00@ 3.50
Brass, heavy, yellow	7.00 @ 7.25	6.75	6.25@ 6.75
Brass, heavy, red	8.25 @ 8.75	9.25	8.50@ 9 00
Brass, light	5.00 @ 5.25	6.00	5.50@ 6 00
No. 1 yellow rod turnings	7.00 @ 7.50	7.00	6.50@ 7.00
Zinc	3.75 @ 4.00	3.00	2.50@ 3.00

TIN PLATES—Charcoal—Bright—Per box.

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	14x20	$12.10	$11.95	$11.50
"A" Grade:				
IC,	14x20	9.70	9.90	9.50
	Coke Plates—Primes—Per box			
100-lb.,	14x20	6.45	6.10	7.00
	Terne Plates—Small lots, 8-lb. Coating—Per box			
IC,	14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0. 10@0. 13½	$0.16	$0 15@0.20
Cotton waste, colored, per lb.	.09@ .13	.12	.12@ 17
Wiping cloths, washed white, per lb	.15½	36 00 per M	15
Sal soda, per lb	03½	02	02¼
Roll sulphur, per lb	.027	03½	04
Linseed oil, raw, per 7½-lb. gal., 5 bbl. lots	.84	91	86
Lard cutting oil, 25% lard, in 5 gal. cans, per gal.	.65	50	.50
Machine oil, medium-bodied (55 gal. metal bbl.), per gal.	.27	35	.29
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin. ft per inch of width for single ply.			
Medium grade	40–5%	40–5%	40–5%
Heavy grade	30–10%	30–10%	30–10%
Rubber transmission, 6-in., 6 ply, $1.83 per lin. ft.			
First grade	50%	50–10%	50%
Second grade	50–10%	60–5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0324	$0.0324	$0.0324
Cold drawn shafting	per lb.	.04	.04	.04
Brass rods	per lb.	.1525	.155	.1687½
Solder (½ and ½)	per lb.	.39	.41	.40
Cotton waste, white	per lb.	.10@13½	.10@.13½	.13@.17½
Emery disks, cloth, No. 1, 6 in. dia.	per 100	3.10	3.10	3.55
Lard cutting oil	per gal.	.65	.65	.55
Machine oil	per gal.	.27	.33	.35
Belting, leather, medium	off list	40–5%	40–5%	40–5%
Machine bolts, up to 1x30 in., full kegs.	off list	50%*	50%*	40%

*New list April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials—In sheets 9x11 in., No. 1 grade, per ream of 480 sheets:			
*Flint paper	$5.13	$4.95	$5.13
*Emery paper	10.71	9.15	10.71
*Emery cloth	27.84	27.85	27.84
Emery disks, 6 in. dia., No. 1 grade, per 100:			
Paper	1.29	1.27	1.32
Cloth	3.10	3.05	3.05
Fire clay, per 100 lb. bag		.75	.75
Coke, prompt furnace, per net ton		Connellsville,	3.00@3.25
Coke, prompt foundry, per net ton		Connellsville,	4.25@4.75
White lead, dry or in oil,	100 lb. kegs		New York, 13.75
Red lead, dry	100 lb. kegs		New York, 13.75
Red lead, in oil	100 lb. kegs		New York, 15.25

*4½ reams and under.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

	Broken Kegs or Cases	Full Kegs or Cases
Machine bolts, square heads and nuts:		
Up to ¾ x 6-in	50%	50–10%
Larger up to 1 x 30-in	45%	50%
1¼ and 1½ in. dia	30%	35%
Carriage bolts:		
Up to ¾ x 6-in	50–10%	.....
Larger sizes	50%	.....
Coach and lag screws:		
Up to ¾ x 6-in	50–10%	.....
Larger sizes	50%	.....
Tap bolts, hexagonal heads	45%	.....
Nuts:		
Hot pressed, square and hexagonal, blank or tapped	45%	50–10%
Cold punched, square and hexagonal, blank or tapped	45%	50–10%
Semi-finished, hexagonal, tapped, in packages	40%	.....
Case hardened, hexagonal, tapped, in packages	30%	.....
Washers: Deduct from list, per 100 lb	$1.50	$3.50
Rivets, button and cone head:		
Small, including ⅞-in. dia	.....	50–10%
Large (base) per 100 lb	$6.50	$5.00

EXTRA per 100 lb. on rivets, for ¼-in. dia., 35c.; ⅜-in., 15c.; 1-in., 5c.; length 1-in. and shorter, 25c.; longer than 1-in. up to and including 1¼-in., 15c.; longer than 5-in., 25c.; standard countersunk head, 25c.

Machine Requirements and Industrial Construction

Equipment Wanted

Ind., Anderson—Maring Wire Co., Muskegon, Mich.—machinery and equipment for the manufacture of magnetic wire for proposed 110 x 250 ft. plant at 31st and Noble Sts. here. Estimated cost $50,000.

Mass., Boston — Schoolhouse Dept., City Hall—milling machines for various schools.

Mass., Brighton (Boston P. O.)—M. M. Dwyer, 77 Linden St.—miscellaneous tools and equipment for proposed repair and service garage. Estimated cost $40,000.

Mass., Brockton—P. Wychumas, 50 Ames St., Montello—miscellaneous tools and equipment for proposed garage and welding shop here. Estimated cost $40,000.

Mass., Hyannis—J. H. Connolly, Depot Sq.—miscellaneous tools and equipment for proposed garage and repair shop. Estimated cost $40,000.

Mass., Malden (Boston P. O.)—L. M. Fowler, 424 Pleasant St.—miscellaneous tools and equipment for proposed repair and service garage. Estimated cost $40,000.

Mass., Waltham (Boston P. O.)—Owner, c/o W. M. Haines, 32 Riverview Ave., Archt.—miscellaneous tools and equipment for proposed garage and repair shop. Estimated cost $50,000.

Mass., Worcester—Thompson Wire Co.—one 5-ton overhead electric crane.

O., Cincinnati—Cincinnati Machinery & Supply Co., 210 Pearl St.—93-C. or 94-B Toledo double crane press or equivalent.

O., Columbus—Bd. of Education, 270 East State St., will receive bids until Aug. 5 for six 13¼ x 4 ft. two 14 x 5 ft. and one 16 x 6 ft. metal lathes and chucks for manual training department in South high school.

O., East Columbus—Ralston Scales Co., J. J. Frank, Purch. Agt.—four drilling machines, two automatic machines, two small presses and other equipment for proposed new plant.

Pa., Pittsburgh—American Sheet & Tin Plate Co., Frick Bldg., M. S. Dennis, Purch. Agt.—one 15-ton overhead traveling crane.

Tenn., Cleveland—Taylor Plow Co., Waterhouse St.—machinery and equipment for the manufacture of tractor disc plows for proposed 50 x 125 ft. plant.

Ont., Hamilton—Canadian Westinghouse Co., Sanford Ave.—prices and catalogs on complete equipment for proposed 1-story, 60 x 200 ft. brass foundry, etc. Estimated cost $50,000.

Que., Montreal—A. Goudron, 1184 Berri St.—complete equipment for proposed garage and repair shop.

Que., Montreal—E. A. Vinet, 65 Lapailleur St.—general equipment for proposed repair and service garage.

N. Z., Wellington—New Zealand Government Railways, will receive bids until Nov. 24, for electric luffing crane, electric tilting furnace, etc.

Opportunities for Future Business

Calif., Alhambra—Reliance Mfg. Co., Pasadena, plans the construction of a factory for the manufacture of gas regulators and other apparatus for gas companies, also railroad appliances. Estimated cost $150,000. Architect and engineer not selected.

Calif., Los Angeles—California Corrugated Culvert Co., 9th and Parker Sts., Berkley, plans the construction of a steel plant, etc., on Laguna-Maywood Tract, here. Estimated cost $250,000.

Calif., Los Angeles — Woolwine Metal Products Co., 2421 East 8th St., is receiving bids for the construction of three factory buildings at 52nd St. and Atlantic Blvd. Estimate cost $90,000. Austin Co. of Calif., 777 East Washington St., Archt. Noted May 26.

Calif., Oakland—Spears-Wells Machinery Co., 9th and Cedar Sts., awarded contract for the construction of a 1-story shop.

Calif., Sacramento—Alling Iron Works, 217 O St., will build a 1 story, 40 x 60 ft. shop and foundry on Fifth St.

Calif., San Francisco—Bauer Cooperage Co., 500 Hampshire St., plans the construction of a cooperage plant in southern section. Estimated cost $40,000.

Calif., San Francisco — Golden Gate — Atlas Building Materials Co., 544 8th St., awarded contract for the construction of a 1 story, 30 x 60 ft. machine shop, at 17th and Harrison Sts.

Calif., Tomales—Tomales Joint Union High School Dist., A. D. Hopkins, Clk., is receiving bids for the construction of a mechanics' shop. Estimated cost to exceed $5,000.

Conn., Devon—Aircraft Corp. of America, c/o W. R. Muirhead & Son, Maple St., Bridgeport, Contr. awarded contract for the construction of a 1-story, 150 x 350 ft. factory here.

Ill., Chicago—R. S. Bacon Veneer Co., 4700 Augusta Ave. awarded contract for the construction of a 2 story factory at 4700-4728 Augusta Ave. Estimated cost $200,000.

Ind., Anderson — Cleveland, Cincinnati, Chicago & St. Louis Ry., 230 East 9th St., Cincinnati, O., will receive bids until July 31 for the construction of a 112 x 205 ft. shop, 126 x 450 ft. roundhouse, etc. here. H. Baldwin, Ch. Engr.

Ind., Ligonier—Ligonier Refrigerator Co., is having plans prepared for the construction of a 3 story, 50 x 95 ft. factory. Estimated cost $100,000. A. M. Strauss, 415 Cal-Wayne Bldg., Archt.

Ia., Waterloo—John Deere Tractor Co., awarded contract for the construction of a 1 story, 120 x 300 ft. tractor factory at Miles and Commer Sts. Estimated cost $60,000.

Mass., Cambridge (Boston P. O.)—Massachusetts Institute of Technology, W. S. Stratton, pres., awarded contract for the construction of 3 story, 60 x 150 ft. engineering building here. Estimated cost $225,000.

Mich., Detroit—Hudson Motor Car Co., 12601 East Jefferson Ave., will receive bids about July 27 for the construction of a 1 story, 200 x 500 ft. factory on Jefferson Ave. A. Kahn, 1000 Marquette Bldg., Archt.

Minn., St. Paul — Cross Metal Products Co., A. Cross, Pres., 410 North Syndicate Ave., will build a 2 story factory at Como Ave. and Belt Line bridge.

Mo., Joplin—H. T. Moss, Lathrop Bldg., Kansas City, plans the construction of an ore mill here.

Mo., St. Louis—Commercial Foundry Co., 7823 Alabama Ave., awarded contract for the construction of a 1 story, 104 x 125 ft. foundry. Estimated cost $30,000.

N. J., Hillside (mail Elizabeth)—Breen Iron Works, 276 Badger Ave., Newark, is having plans prepared for the construction of a 1 story, 60 x 200 ft. factory. Estimated cost $40,000. Private plans.

N. J., Jersey City—Yale Electric Corp., 60 Tillary St., Brooklyn, N. Y., awarded contract for the construction of a 6 story factory at Mill Rd. and Academy St. Estimated cost $750,000. R. G. Cory, 30 Church St., New York, Archt. and Engr.

N. J., Kearny—Western Electric Co., 195 Broadway, New York, will soon award contract for the construction of a 6 story, 60 x 420 ft. factory. Estimated cost $700,000. O. G. Spurling, c/o owner, Archt.

N. J., Linden—Radio Electric Clock Corp., 50 Church St., New York, N. Y., will build a 1 story, 40 x 100 ft. factory, etc. Estimated cost $55,000. W. Meyer Jr. and R. E. Gevez, 71 Bergenline Ave., West New York, N. J., Archts.

N. Y., Maspeth—Ideal Chair Co., 1406 Metropolitan Ave., Brooklyn, awarded contract for the construction of a 3 story factory at Grand St. and Garrison Ave. Estimated cost $400,000.

N. Y., New York—Kent Automatic Parking Garage, Inc., M. A. Kent, Pres., 350 Madison Ave., plans the construction of a 28 story, 50 x 200 ft. garage at 208-210 East 44th St. to 209-211 East 43rd St. Estimated cost $1,250,000. Architect and engineer not selected.

O., Canal Fulton — Fulton Drop Forge Co., will soon receive bids for the construction of a 2 story foundry to replace fire loss. Estimated cost $40,000.

O., Cleveland—Carnegie Body & Top Co., E. S. Eckstein, Secy. and Treas., awarded contract for the construction of a 1 story, 85 x 92 ft. factory at 6115 Carnegie Ave. Estimated cost $40,000.

O., Cleveland—City Foundry Co., W. C. Sayle, Secy. and Treas., 4692 Hamilton Ave., awarded contract for the construction of a 1 story 60 x 120 ft. foundry at 4629 Hamilton Ave. Estimated cost $50,000.

O., Cleveland—The Marble & Shattuck Chair Co., T. W. Foote, Mgr., 10200 Foster Ave., will soon award contract for the construction of two 4 story, 66 x 121 and 80 x 100 ft. factory buildings. Estimated cost $175,000. H. M. Morse & Co., Finance Bldg., Archts. Noted June 30.

O., Cleveland—Wilber Watson & Associates Co., 4614 Prospect Ave., Archts., will soon award contract for the construction of a 1 and 3 story, 66 x 157 ft. factory addition for Cleveland Punch & Shear Co., W. Sayle, V.-Pres., 3917 St. Clair Ave.

O., Lebanon—Eco-Thermal Stove Co., will soon receive bids for the construction of a factory to replace fire loss at Cincinnati Pike. Estimated cost $50,000.

O., Middletown — American Rolling Mill Co., G. M. Verity, Pres., plans the construction of several additions to plant. Estimated cost $200,000.

O., Wheelersburg — Wheelersburg Wood Ware Co., is receiving bids for the construction of a 2 story, 56 x 137 ft. factory. Estimated cost $50,000.

Pa., Carlisle—C. H. Masland & Son Inc., Ambec and Westmoreland St., Philadelphia, awarded contract for the construction of a 1 story, 167 x 210 ft. mill including electric furnaces, etc., here.

Pa., Philadelphia—Hall Bros. & Wood, Lancaster St., awarded contract for the construction of a 2 story mill work plant on Lancaster St. Estimated cost $80,000.

Tenn., Nashville — Lamb & Co., I. B. Lamb, Pres., 110 North 1st St., manufacturers of furniture, plans the construction of a factory on Duncan St. Estimated cost $100,000.

Tex., Dallas—Neiman-Marcus Co., Main and Ervay Sts., awarded contract for the construction of 4 story shop buildings at Commerce and Ervay Sts. Estimated cost $200,000.

Tex., Galveston—C. S. Porter, 1115 35th St., manufacturers of wire and nails, is having preliminary plans prepared for the construction of a plant. Estimated cost $45,000. Private plans.

Tex., Sherman—Day Mfg. Co., L. A. Mgr., manufacturers of wooden boxes, is having plans prepared for the construction of addition to factory.

Wash., Seattle—Kenworth Motor Truck Corp., V. A. Smith, Gen. Mgr., awarded contract for the construction of a 2 story, 120 x 240 ft. factory at Yale and Mercer Sts. Estimated cost $100,000.

Wis., Kewaunee—Leyse Aluminum Co., A. Leyse, Mgr., is having plans prepared for the construction of a 2 story, 56 x 97 ft. factory. Estimated cost $40,000. Private plans.